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## Editorial Notes

### The Domestic Load

THE Papers at the Joint Gas Conference in Birmingham on the retention of the domestic gas load, and the lively discussion to which they gave rise, were wholly admirable and might well serve as a model. The Papers were short and to the point and the Authors faced up squarely to the various issues with which they dealt. Speakers in the discussion, too, did not mince matters. There are many problems in connexion with the retention and the development of the domestic load. We think they can be solved, but only by the closest possible co-operation between supplier of gas and manufacturer of appliance—a real understanding of one another's difficulties and a real desire to work together to overcome them.

What we are all aiming at is to increase the consumption per consumer figure on a basis satisfactory to the customer and to the supply undertaking alike. This means the development of the space heating and water heating loads and the retention of the cooking load against all comers; and it must be recognized that the Industry's chief competitor in the space heating and water heating loads is raw coal. Coal is also to some extent a competitor in the cooking field. It is to the substitution of coal by gas that the Industry must look for the increased consumption per consumer figure. The possibilities are enormous and we feel sure they can be realized if the right price policy and appliance selling policy are pursued.

The questions discussed at the Conference were many and varied and all had an important bearing on expansion of sales. Hundreds of thousands of modern gas appliances of all types are being installed. They are automatic, of excellent finish, and more complicated than formerly. They require, for unimpaired service on the district, a scheme of regular maintenance at not too infrequent intervals, the frequency being governed to some extent by local conditions. These appliances are being sent out on cash purchase, deferred terms, and simple hire. It was with deferred terms and simple hire that the meeting was chiefly concerned. It will be agreed that hire purchase is preferable to simple hire, but that there are circumstances where, to retain the load against competition, simple hire is necessary.

It was pointed out, once again, that the vast majority of the Gas Industry's consumers have limited incomes and set aside a very small sum for their fuel requirements. This sum has to cover the purchase of the appliances and also the gas used in them. By their nature modern gas appliances cannot be cheap—and it would be most unfortunate if serviceability and safety were ever sacrificed to cheapness. The question at issue was whether the burden of hire purchase instalments was such that any great increase in gas consumption could be expected for the time being, and the plea was made for the production of more standardized appliances—in particular the gas cooker—to cater for the low-income class.

### Reducing Costs

Now for every manufacturer to make one type of article would put an end to progress. Standardization should not mean, as Mr. Rogers said in the discussion, and as we have emphasized on many occasions, the laying down of close specifications of performance, materials, and design, but rather the avoidance in a given design of individual requests for slight modifications. These modifications are all too frequently the expression of personal whim. Such alterations are costly and defeat the effort made to keep down costs by bulk production. "The majority of these variations," said Mr. Rogers, "do not affect the efficiency of the appliance in the consumer's premises, and manufacturers are confident that a greater appreciation of manufacturing difficulties and costs which would enable them to maintain their standard product would be in the best interests of the Industry." And these individual and unnecessary demands apply to meters also, which are linked up with appliances. The old lights type has still to be manufactured to meet the requirements of certain undertakings, and, further, in the modern high capacity type special features are demanded by this or that undertaking. If any undertaking requiring special features in meters was called upon to pay shillings more per meter, the demand would soon cease.

Then one has to consider the great disparity which exists in the charges to the public made for goods supplied for cash or on hire purchase terms by various undertakings. The variation in price existing in adjacent towns is confusing and annoying. Mr. Dixon, in his Paper, while not suggesting that any appliance should be put out at a loss, remarked that

it apparently serves the purpose of some undertakings to load the cost price with charges for fixing, maintenance, interest, and profit to such an extent as to remove entirely the appliance from the field or class for which it was rightly intended. He shares our view that the policy of taking large profits from subsidiary activities is wrong and against the fundamental principles on which the prosperity of the Industry has been built. Mr. Dixon expressed the opinion that hire purchase can be pursued to the exclusion of all else so far as the development of the space heating and water heating loads are concerned, but that for the cooking load simple hire, in addition to hire purchase, is needed. On the other hand, Mr. Townsend, whose Paper was devoted to water heating, said that a certain amount of water heating business can always be done by outright sale, a larger business can be done on hire purchase, but to obtain orders on a large scale simple hire is indispensable.

## More Uniform Policy Needed

As a general policy we consider it unwise to burden the price of gas with the cost of appliances and their fixing. It results in the impression that gas is dear and it does not lead to the proper and satisfactory use of the appliances. Taking a broad view of the question of appliance sale and installation there is, we suggest, a real need for a more uniform policy. We realize, of course, that the Gas Industry must cater for the low-income class. Even so, there must be many consumers even in this class who, satisfied with—or, better still, proud of—the gas appliances they are buying, will be prepared to economize in some other way than by reducing their gas consumption. The Industry need not regard the situation with despair.

When it comes to those with medium and large incomes the position is very different. Here, by the adoption of attractive tariffs the Industry has untold opportunities. We think the Industry underestimates the buying capacity of what may be termed the minority group of its consumers. Coal can be ousted from a very large number of homes indeed, and gas substituted to the benefit and satisfaction of all concerned. With modern selling one can confidently anticipate a very big increase in the consumption per consumer figure. Several progressive undertakings have already pointed to what can be done in the way of central heating, for example, in quite modest homes with gas in the neighbourhood of 6d. a therm. The possibilities are there, but it must be remembered that the installation of gas equipment demands specialized technique. The use of coal has in many cases led to carelessly designed piping systems, the heat losses by radiation from exposed surfaces often being responsible for something like 30% of the fuel consumption. Careful examination of existing systems is essential before gas equipment is installed. Far too many gas water heaters have been fitted to systems with exposed surfaces and long runs of pipe work. Lagging of apparatus must receive attention.

## Installation and Maintenance

Good installation work has a most important bearing on the satisfaction in use and low running cost of gas appliances in general. The Gas Industry must employ men adequately trained in the fitting of the modern appliances with which they have to deal—and in this regard the manufacturers are willing to help. Good maintenance, too, can play a large part in reducing running costs and prolonging the life of appliances. Mr. Townsend, in his Paper, very rightly made a strong point of this. It is of no use to fix the best of appliances and leave them alone. It is unwise to wait until the consumer complains, because he will not do so, as a rule, until there is a serious drop in efficiency. Again, in regard to this question of the cost of maintenance of appliances and the ensuring of customer satisfaction, the quality of the gas supplied must be borne in mind. Reduction in the sulphur content of the gas supplied would greatly influence maintenance costs in the right direction. It would prolong the life of water heaters and materially increase the period between the need for cleaning. The cost entailed in sulphur reduction would be more than recouped in lower maintenance costs and better all-round service.

We have only touched briefly on a few of the broad issues raised at the Joint Gas Conference. Mention must be made, however, of the success which has attended the lighting policy at Neath, as outlined in the Paper by Mr. Clark Jackson. Mr. Jackson's views on the lighting load are known to readers of the "Journal." He is an out-and-out enthusiast for domestic gas lighting, and he has organized thoroughly to retain and develop the load. He started with a sound maintenance scheme, which unearthed "huge numbers of inefficient lighting points . . . which have since been entirely replaced by modern gas burner and fittings equipment." How can the public appreciate what modern gas lighting can do if the Industry takes no pains to show them? Mr. Jackson did take pains, and his policy has paid him handsomely.

The aim, as we have said, is a high consumption per consumer figure. Gas lighting can make a deal of difference to the look of this figure. Let us quote a few figures from Neath. In January, 1931, the Gas Department there had 8,217 consumers; the number of domestic gas lighting burners in use was 19,500. In January, 1939, there were 10,101 consumers; 27,563 gas lighting burners were in use. That Mr. Jackson's fighting policy has proved advantageous is shown by the fact that, notwithstanding the large amount of unemployment from which the district has suffered during the past 12 years, the average consumption of gas per domestic consumer has increased from 1926 by over 1,000 cu.ft. per annum. Surely there is a moral in this.

## Storage of Coal

The Paper on the deterioration of coal on storage which Mr. Jamieson and Mr. Skilling presented at the Special General Meeting of The Institution of Gas Engineers this month is yet another example of the very great value of the co-operation which steadily becomes closer between the Gas Industry and the Fuel Research Board. We have for long advocated such co-operation, and we welcome the results of its development. That the effect of storage on coal is important to the Gas Industry goes without saying, and the Authors of the present Paper—which will have a much wider use than only in the Gas Industry—have put an enormous amount of work into their endeavour to elucidate the problem. Prior to the Institution meeting we published, in our issue of March 1, an extract from the Paper, and in last week's "Journal" we gave a full report of the discussion at what proved a thoroughly successful and helpful meeting.

As we have said, a vast amount of detailed work was involved in the investigation and innumerable analyses were carried out. Twenty Scottish coals were selected and laid down in heaps of about 8 tons, portions being removed at intervals of 15, 24, and 44 months for analysis and car-

bonization tests. In addition, seven of these coals were laid down in heaps of 200 tons and after a period of 44 months removed for carbonization in vertical gas retorts with steaming. Research work of this type is fraught with considerable difficulty and there are, as the Authors themselves pointed out, many anomalies. We have heard it stated that certain coals are found to improve on storage and to give superior results after several months' exposure. The results set out in the Paper, to a few of the main ones of which we will refer, are not easy of interpretation. As an example, owing to the increased handling to which the weathered coals were subjected as compared with the fresh coals, the Authors were unable to state with accuracy how much breakage was due to weathering effects and how much to mechanical breakage. It can be accepted, however, that size deterioration takes place in most types of coal to varying degrees. Though this deterioration will be reflected in the size of coke from non-caking coals, with coal of good caking properties a considerable recovery in size may be expected, the amount of which will be dependent to some extent on whether carbonization is static or mobile. Coals of relatively low caking power lose sufficient caking power on storage to produce a coke of very small size; and this decrease in size of the coke constitutes a serious loss of revenue.

## Influence on Cost of Gas Manufacture

THE Authors discussed the effect of storage upon costs of gas manufacture, basing their conclusions on the experiments with the vertical retorts and coal which has a tendency to lose caking power during storage. There is, of course, first the cost of stacking the coal and recovering it, and the loss due to reduction in size which this handling causes. The most important cause of increased cost, however, lies in the fact that the proportion of lump coke produced from stored coal may be very much less and the revenue from coke sales correspondingly reduced. The thermal yield of gas may also be less, but the loss would have relatively less effect. These conclusions apply to coals where the normal caking power of the fresh coal leaves only a small margin of safety. Where the caking power of the fresh coal is higher, storage may be possible for much longer periods before a stage is reached where the proportion of breeze in the coke is increased to any extent. Calculating on two particular coals investigated, the Authors gave the increased cost of gas manufacture as from 0·13d. to 0·54d. per therm made. If gas cost 1·2d. a therm to manufacture, these increases would represent 11% and 45% respectively.

All the coals examined, it should be borne in mind, were of a rather weakly caking type, and storage for even a short time would seriously affect their caking value. Consequently the conclusions arrived at by the Authors of the Paper cannot be taken to apply generally to all gas coals. The statement was made that for coals of the type examined, storage for 42 months is sufficient greatly to increase the net cost of coal per therm of gas produced, taking into account only the reduction in size of the coke available for sale. With coals having a sufficient reserve of caking power the effects may be slight even after four years' storage. "Coals with a low caking power of 15 or less have too small a reserve of agglutinating properties to be able to produce a coherent coke after some comparative short time of storage. Those with a higher caking index, 18 and upwards, have a larger reserve of agglutinating power, so that, although they do lose caking power on being stored, they may retain sufficient to produce a massive coke unless the period of storage is altogether too long."

Summarized, the results of the work indicate that it is not desirable to place in storage coals of low caking index for use in gas production. The Authors concluded: "It is not so much from the point of view of the quality of the gas produced, but the difficulties created in controlling the throughput of low-caking coals containing large percentages of small size material. Coals of good caking qualities will give less trouble and yield a reasonably massive or coherent coke, but some knowledge of the capability of these caking coals to retain their caking properties should be available in making a selection." There is no doubt that a knowledge of which coals to store and which not to store, and the conditions under which the changes that take place are least deleterious to the working results of a gas undertaking, is not only desirable but necessary.

## Useful Suggestions

THE discussion on the Paper, as we have already indicated, was excellent, many interesting views being expressed and suggestions made. Dr. Hollings, referring to the Authors' difficulty in finding a simple mode of expression of the effects of storage on the gasmaking properties of coal, because of the variations in the inert and water gas content of the gases produced, suggested the application of the Hydrocarbon Enrichment Value expression due to Pexton. Dr. Hollings set out a table of hydrocarbon enrichment values of the coals tested and expressed the view that future workers in the field might well consider the desirability of such calculations in checking and interpreting results, since the H.E.V. does indicate the variation in the value of the coal when considered from the aspect of gasmaking. Dr. King raised the question of the heating of coal on storage—a question not considered in the Paper. Under the conditions used by the Authors of the Paper, self-heating of the coal was avoided, and their results apply only to this state of affairs. When the temperature of the coal rises, the rate of deterioration increases rapidly. In the storage of coal there are two conditions which avoid self-heating; one is no ventilation at all, such as storage under water, and the other is over-ventilation. It is possible that had the Authors employed a large dump and reduced the ventilation well below the dangerous limit, the rate of deterioration of the coal might have been less than that indicated in the Paper. Dr. King suggested that it might help the Gas Industry to make an organized attack on the problem by laying down large dumps of coal stacked under different conditions and in such a way as to bring in all the variables possible. The Fuel Research Board would no doubt be willing to co-operate in such work.

Dr. King gave some highly interesting figures relating to the effect of storage of coal from the Forest of Dean area. These showed the influence of the size of the coal on its rate of deterioration—the smaller the size the more rapid the deterioration. This point of influence of size was brought out by the writer of an article in the "JOURNAL" a few years ago, who put forward the view that attention might well be given to the storage of slacks under water. Such storage would have the advantage that the cheapest variety of coal could be stored and it would not deteriorate. There is, of course, the question of capital cost to consider —whether this would be out of proportion to the advantages gained. On this matter of ventilation of coal heaps Mr. Davis mentioned that during the coal strike of 1926 the

South Metropolitan Gas Company had a considerable quantity of American coal at one of its works. A good deal of that coal was placed in an inside store and compacted hard. About eight years later the condition of the coal was investigated, and it was found that the coal stored in that way, with practically no ventilation, was almost as good as when placed into store. We would, finally, refer to one other interesting point raised during the discussion. The Authors found little or no diminution of the calorific value of the coals after storage. But what, asked Dr. Foxwell, about the total calorific value? How was the calorific value per pound of coal as laid down affected? This point could, of course, be determined by weighing the coal before and after storage.

# The Durham Coal Price Appeal

On Monday last, the Central Appeal Tribunal established under the Coal Mines Act, 1938, gave judgment in the appeal of the Newcastle Gas Company from the decision of the Durham Committee of Investigation. The essence of the appeal was that the Durham Sales Control Committee, acting on behalf of the Durham Executive Coal Board, had fixed special permit prices for the Newcastle Gas Company which were unfair and inequitable having regard to the permit prices fixed in respect of the London coals.

Although unfortunately the Central Appeal Tribunal upheld the decision of the Durham Committee of Investigation, it was apparent from the extreme care and attention which the members of the Appeal Tribunal gave to the appeal that the consumers of coal can feel that their interests are in the hands of a competent and impartial body. Although on many occasions we have to comment upon the partiality displayed by certain members of Committees of Investigation, no such complaint can be made in respect of the Central Appeal Tribunal.

At the beginning of the hearing it was suggested by the coal interests that the Tribunal should consider only the evidence which had been laid before the Committee of Investigation, and should base their decision entirely upon that evidence, subject to such further information on points of detail as might appear to them to be necessary. The Tribunal decided that they could not adopt this procedure, but that they would treat every appeal as a re-hearing, and investigate fully all the facts and circumstances relating to the particular question under consideration. The Appeal Tribunal have not, however, laid down any precise decisions as to the meaning of such words as "unfair, inequitable or against the public interest." These words which are contained in the Act must necessarily remain somewhat vague, and the Tribunal contented themselves with giving reasons why in this particular case they did not think that the prices fixed by the Durham Sales Control Board fell within any of those terms.

They pointed out that it was the intention of the Sales Control Board to obtain a 5s. increase in respect of all coal, but that circumstances were such as to make it impossible for them to secure this increase in respect of coal supplied to London Gas Companies. The Tribunal held that the fact that a lower price was accepted from the London Gas Companies did not constitute a circumstance which was unfair or inequitable to the Newcastle Gas Company, since, as they pointed out, if the London contracts had been lost, the increase which it might have been necessary to demand from the local gas companies might have been greater.

Further, on the point of public interest, the Appeal Tribunal decided that in the present case, even if it were intended to pass on the whole of the increase in coal prices to the consumer, the resultant addition to the price of gas would not be seriously detrimental to the business of the Gas Company. They refused on this ground to hold that the increase in price was against the public interest. While they appreciated the importance of the prosperity of the Gas Industry, they pointed out that the prosperity of the coal industry was also of vital national interest, and these two factors must be in some way reconciled.

Much had been said with regard to the advantageous geographical position of the Newcastle Gas Company, and upon this point the Tribunal stated that they were not satisfied "that it would be right so to separate that advantage from the disadvantage of being unable to benefit by comparative prices so as to allow them, while enjoying the advantage to the full, to be fully relieved from the disadvantage."

In our view, the Coal Appeal Tribunal are to be congratulated on their clear and reasoned judgment, although we naturally regret that the case of the Newcastle Gas Company did not commend itself to them. It is clear, however, that as recourse is had to the Central Appeal Tribunal, the principles by which Coal Executive Boards are to be guided will gradually be clarified, and the feeling which has been too prevalent in the past that the Sales Control Committees are a law unto themselves will diminish.

## A Worth While Suggestion?

When busy over the preparation of a particularly useful issue of the "Journal," we have frequently found ourselves assailed by a feeling of regret that the information upon the gleaning and the presentation of which so much pains had been taken, or the research work to which so much patient labour had been devoted, was not available to a still larger circle of readers—to those near the bottom of the ladder, as well as to those on the higher rungs. So frequently, indeed, have we been seized with this regretfulness, that it has become almost an "old lament" with us. And we are not alone in this, as a glance at the top six lines of the first column on p. 663 of the "Journal" dated March 8 will show. In a Paper to the Western District Section of the Scottish Junior Gas Association, Mr. D. Beavis, of Helensburgh, bemoaned the fact that, "in the event of a defect developing in one of the more complicated appliances, the fitter has little idea of how to locate it, though it may be well within his powers to remedy it once it is indicated to him." In Mr. Beavis's view, "the fundamental difficulty would appear to be the lack of any form of technical knowledge, and the absence of appreciation of the phenomenon of combustion." On this, one of the speakers in the subsequent discussion put forward what we regard as a worth while suggestion—"that the fitters should be supplied with the literature that the managers usually got." No doubt, it was the smaller undertakings that were in mind when these remarks were made. These are the undertakings which can afford perhaps less than others to be without regular copies of the "Journal" among the staff, as well as for the management.

# The Institution of Gas Engineers

## 76th Annual General Meeting (Murdoch Centenary)

The 76th Annual General Meeting (Murdoch Centenary) of The Institution of Gas Engineers will be held in London on June 6, 7, 8, and 9, under the Presidency of Mr. Robert Robertson (Bristol). The Business Sessions will be held at the Institution of Civil Engineers, Great George Street, London, S.W. 1.

The Reception and Dance will be held at Grosvenor House, Park Lane, London, W. 1, on Tuesday, June 6. Members are advised to reserve hotel accommodation without delay.

The detailed programme, which will include a Murdoch Centenary Lecture, will be circulated early in May.

# Personal

Mr. H. C. SMITH, Chief Engineer of the Tottenham and District Gas Company, has been appointed a Justice of the Peace for Middlesex.

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Mr. H. G. PALMER, A.C.A., has been appointed Assistant Secretary and Chief Accountant of the Bristol Gas Company.

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Mr. HENRY F. H. JONES has been appointed a Director of the South Metropolitan Gas Company in place of the late Mr. Harold Gundry.

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We learn from Messrs. William Coward & Co., Ltd., that they have received instructions from the National Gas Association of Australia to appoint Mr. A. R. WAYMAN to the position of Industrial Gas Engineer to the Association. Mr. Wayman has been on the Industrial Staff of the Gas Light and Coke Company for a number of years and was selected from a large number of applicants for the position. He leaves England to take up his work in Melbourne on April 22.

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At their centenary annual meeting the Directors of the Wrexham Gas Company made a new departure by the appointment to the Board of Mr. OWEN EVANS, who has been Engineer and Manager for 25 years.

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Mr. WILLIAM MALCOLM, formerly with the Oban and District Gas Company, has taken up his new duties as Manager to the Auchtermuchty Gas Light Company.

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Two leading officers of the Halifax Women's Gas Development Association are among a number of new magistrates just appointed for the town. They are Mrs. MARIA LAVINIA BRENARD, former Mayoress, wife of a magistrate, and a Vice-President of the Gas Development Association, and Mrs. ANNIE MAUDE CHAMBERS, Hon. Secretary of Gas Development Association since its formation five years ago.

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We are informed that owing to the ill-health over an extended period of Mr. STANLEY C. WHITFIELD, he has resigned his position as Joint Managing Director of General Gas Appliances, Ltd., as from March 31, and Mr. S. F. CORBY has been appointed Managing Director of the Company as from that date. Mr. Whitfield still retains his seat on the Board and hopes still to keep in touch with his many friends in the Gas Industry.

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On Wednesday last Mr. H. J. RANDALL, Managing Director of the Yorktown (Camberley) and District Gas and Electricity Company, was installed in the Chair of the Evening Star Lodge, No. 1,719.

# Obituary

We learn with regret of the death of Mr. WILLIAM MOULT on March 20 in his seventy-fifth year. Mr. Moult had been Engineer to the Cefn Mawr and Rhosymedre Gas Company since 1904, during which time, under his able guidance, the Undertaking has made great strides.

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We regret to report the death of Mr. EDWARD GRAY GRIMSHAW in his seventy-sixth year.

Mr. Grimshaw commenced his career in the Gas Industry in 1878, at the age of fifteen, and was connected with the Calverley and Horsforth District Gas Company for sixty-one years. He held the position of Manager and Secretary from 1890 to 1920, when he relinquished the duties of Manager, but retained the position of Secretary until his retirement in September, 1934. Mr. Grimshaw was elected to a seat on the Board of Directors in 1933.

# Forthcoming Engagements

**March**

**29.—Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Fuel Economy in Gas-Works."

**30.—Midland Juniors.**—Film Display by courtesy of Messrs. Thomas Firth & John Brown, Ltd., Council House, Birmingham.

**31.—I.G.E.**—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

**April.**

**3.—L.C.C.A.**—Technical Committee, 2.30 p.m.

**3.—I.G.E.**—Joint Lighting Committee, 2.30 p.m.

**4.—I.G.E.**—Ad Hoc Joint Committee on Research, 11 a.m.

**5.—Manchester and District Juniors.**—Visit to Corby Works of Messrs. Stewarts & Lloyds, Ltd.

**5.—Yorkshire Juniors.**—Visit to Corby Works of Messrs. Stewarts & Lloyds, Ltd.

**8.—Scottish Juniors (Eastern).**—Visit to Pumpherston Refinery of Scottish Oils, Ltd.

**14.—North British Association.**—Spring Meeting at Leven.

**15.—London and Southern Juniors.**—Visit to Nine Elms Gas-Works.

**19.—National Gas Organizations in Scotland.**—Annual Meeting of Federation of Gas Employers, 11.30 a.m.; Annual Meeting of National Gas Council, 2.30 p.m. Both meetings at Central Station Hotel, Glasgow.

**20.—Southern Association (Western District).**—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

**22.—Western Juniors.**—Annual General Meeting at Bristol.

**22-25.—B.C.G.A.**—Annual Conference at Brighton.

**26.—I.G.E.**—Domestic Heating Committee, 2.30 p.m.

**26.—Southern Association (Eastern District).**—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Breeze Production and Disposal."

**28.—I.G.E.**—Specifications Sub-Committee of the Refractory Materials Joint Committee, 2.30 p.m.

**29.—Midland Juniors.**—Visit to Coventry Works of Geo. Wilson Gas Meters, Ltd., and to Foleshill Gas-Works.

**May.**

**6.—Manchester and District Juniors.**—Visit to Higginshaw Gas-Works, Oldham. Paper by F. Cartledge on "Coal and Coke Handling Plant at Higginshaw."

**9.—London and Scottish Juniors.**—Annual Business Meeting.

**11.—Midland Juniors.**—Annual General Meeting. Address by G. Dixon (Nottingham).

**13.—Scottish Eastern Juniors.**—Annual General Meeting at Edinburgh. Presidential Address of R. Cowie, Jnr. (Hawick).

**13.—Yorkshire Juniors.**—Meeting at Harrogate. Short Papers by D. C. Gunn, J. W. Stacey, and H. Ramsden.

**25.—Wales and Monmouthshire Association.**—Annual Meeting at Newport.

## North British Association

### New Secretary and Treasurer

Mr. R. Sturrock, Engineer and Manager, Ardrossan Gas Department, has been appointed Hon. Secretary and Treasurer to the North British Association of Gas Managers in succession to Mr. A. Kellock, Engineer and Manager of the Airdrie Gas Department.

## "Specification," 1939

### Reviewed by "Critic"

The 41st edition of Specification (The Architectural Press, Ltd., 9, Queen Anne's Gate, Westminster, S.W.1, price 10s. 6d.) deals with nearly one thousand proprietary products, and, including the usual informative advertisements, extends to 945 pages.

The Editor's aim is ultimately to embrace as nearly as possible all products used in building, and with this end in view details of several types of product are now presented in the form of compact tables in order to provide space for more new editorial material. While agreeing with this policy the writer cannot agree that the omission of the "Gas Engineer" section from the "Division of Trades" is justifiable without some explanation. Although the 1938 edition dealt fairly comprehensively with gas engineering new readers are surely entitled to expect a pointed reference to this effect.

Under the heading "Heating and Ventilating Engineer" coke boilers and gas apparatus for space and water heating are discussed. Gas Cooking and Refrigeration are dealt with for the first time under the heading "Building Equipment." In this section there is an elaborate schedule of electric cookers covering three pages dealing with the products of fifteen manufacturers. Dimensioned sketches of the various models are shown together with wattages, price, and the number of persons catered for. A spirited reply to this splendid co-operative effort should be forthcoming from the manufacturers of gas cookers in a future edition.

Specification as usual is full of interesting up-to-date information clearly set out, and no one interested in modern architectural practice should be without a copy.

# H. James Yates

**In their Report for the year ended Dec. 31 last the Directors of Radiation Ltd. announce that their Chairman, Mr. H. James Yates, who is also Managing Director, will be retiring shortly after the General Meeting, which is to be held to-morrow. Mr. Yates has devoted the whole of his business life to the gas appliance industry and was the founder of Radiation Ltd. in 1919. Sir C. Herbert Smith has accepted the office of Chairman of the Company.**

Born in 1873, H. James Yates is a member of a family which has been intimately connected with the history, and the later commercial development, of Birmingham from the beginning of the 14th Century, Roger atte Gate being the first to leave his name on record in connexion with the endowment of a Priory in 1310.

When James Yates was only twelve years old, his father built for him at home a well-equipped laboratory and workshop containing a steam engine, lathe, and various machines with tools. Even in those early days he lit his laboratory and workshop with electric light, and, having no dynamo, employed a home-made type of primary battery which worked without attention for at least three months. Small carbon filament lamps of about 5 candle-power were specially made by Mr. Swan, of Edison Swan, for the young scientist. During his school holidays, just for a hobby, he used to go into the machine shop at his father's works, making tools, &c.

Another sidelight on the character which has shaped Mr. Yates' career is afforded by the interest which he took, at the age of 21, in X-ray work. The late Professor Crooks had made for him some of the earliest tubes, and the late Mr. Harry Cox, of Cursitor Street, Chancery Lane, supplied him with a 14-in. spark coil. A doctor friend used to bring patients to him on Sunday mornings for X-ray examination. Owing to pressure of business, however, he was compelled to give up this hobby.

These early reminiscences are a significant pointer to Mr. Yates' subsequent career, which has been built upon a realization of the value of research. Considering the scope of his achievements, it is extraordinary to realize that he had no scientific training in the accepted sense of the term. On the other hand, the fact that he was a natural scientist and was capable of directing his own training probably accounted for the very practical lines along which his research has always been conducted. It has led to solid accomplishments which have had enormous influence on the prosperity of the Gas Appliance Industry and have helped to bring ease and comfort to millions of homes.

It was in 1893 that Mr. Yates' father acquired for him the gas stove business of Arden Hill, of which he thus became proprietor at the early age of 19. He developed the business so rapidly that within a few years he was able to build entirely new works equipped with up-to-date plant.

His first big invention appeared in 1894—a gas cooker with removable burners for the hotplate and oven, which revolutionized gas cooker design and began the era of great development in this important branch of the Gas Appliance Industry's business.

So rapidly did the Arden Hill business grow that before long Mr. Yates was approached by John Wright & Co., Ltd., to join up with them. An amalgamation was effected in 1900 with Mr. Yates as Managing Director and in 1908 he became Chairman of the Company.

In this year the next notable result of his research work came to light in his invention of the vertical columnar radiant for gas fires. It was Mr. Yates' personal experience—confirming that of others—which convinced him that the principle of the early types of gas fire was incorrect. By Mr. Yates' invention radiant heat, or radiation, was increased and the convected heat given by the old type of fire was reduced, and here again began a new era for the Gas Appliance Industry.

In those early days laboratories at the works were unthought-of, and Mr. Yates carried out, in his own home laboratory, the research which led up to such memorable advances. He was, however, one of the first to realize the need for research and technical control in factories, and he installed laboratories at the works which were formally opened in 1909 and were objects of great interest to large numbers of visiting scientific men.

Another notable invention was in 1915, when Mr. Yates produced the injector-ventilator gas fire, which ensured adequate ventilation of the room in addition to warming it.

It was in 1919 that Mr. Yates brought about the formation of Radiation Ltd., and one of his first moves naturally was to equip the combine with the very best possible facilities for research. Radiation House, London, was acquired and laboratories for pure research work were established there, together with Research and Demonstration Kitchens. Many visitors, some of national or international repute, have shown keen interest in the work carried out in both.

To digress one moment from the affairs of Radiation Ltd., Mr. Yates was a member of the first Gas Heating Research Committee formed in 1909 under the joint direction of The Institution of Gas Engineers and Leeds University. The first subject of investigation was the measurement of the radiant efficiency of gas fires and the determination of flue heat. Mr. Yates took an active part in this work, and subsequently, with the late Professors W. A. Bone and H. L. Callendar, devised the B.C.Y. Bolometer. He maintained close touch with Professor Bone when the latter went to the Imperial College of Science and Technology, South Kensington, where Mr. Yates established a Radiation Fellowship. One of the latest instruments developed at the Radiation Research Laboratories is the Integrating Radiometer.

The year 1923 saw the introduction of the "New World" "Regulo"-controlled cooker—the culmination of years of gas cooker research work. With its single burner at the back of the oven and bottom-flue-outlet, it revolutionized domestic gas cookers and was the first in this country to have automatic oven-heat control which enormously simplifies cooking. The controller was named the "Regulo"—a registered Trade Mark now known all over the world. Continued intensive research has produced in subsequent years a succession of developments which have still further improved the original "New World" of 1923.

Always a firm believer in the advantages of National Press Advertising, Mr. Yates as Chairman of Radiation Ltd. inaugurated the first publicity campaign to make known the advantages of gas cookers and fires, with an annual expenditure that has made the Company one of the largest national advertisers in the country.

From the date of Mr. Yates' entry into the gas stove business he has taken out a very large number of patents. Naturally he has been a member of many scientific bodies and associations, and he is one of the Founder Members of the Federation of British Industries and of the International Chamber of Commerce.

Considering the fullness of his scientific and business life, he has found time for quite an extraordinary number of private interests. He was one of the earliest motorists, drove his own car long before registration numbers existed, and in early days took part in motor racing. He was a member of the first Civil Aviation Board and took a profound interest in the development of flying. He was closely associated with the late General Sir Sefton Brancker, and in recent times has himself taken up flying and obtained his certificate.

As a young man, Mr. Yates became an expert photographer. He still has a copy of a photograph taken during a stay at Vitre in 1899—at the time of the Dreyfus trial—of the approach to the dungeon of Mont St. Michel. This was exhibited at the Royal Photographic Society, and was proclaimed the picture of the year. The original went to a Paris gallery and was retained there. Mr. Yates' work was shown at many other exhibitions.

Even as a boy he was an enthusiastic collector, and he has today an interesting collection of Period furniture, old silver, and some of the finest known pieces of Chinese porcelain. He has long been a keen gardener, and his country residence is adorned by a beautiful Italian garden containing Italian bronzes and pottery, with old Spanish tiles in the walls.

Little time has been available in recent years for his favourite sports of fly-fishing, shooting, and golf, but Mr. Yates is looking forward now to resuming his acquaintance with them.

His elder son, J. Ivan Yates, has had practical works training in England and abroad, for a number of years, and is now a Director of Radiation Ltd., and Maurice, the younger, is a Decorative Architect of great versatility with a knowledge of architecture and decoration from the earliest times to the present day, acquired through extensive travels in many countries.

# Letters to the Editor

## Economics of Benzole Recovery

SIR,—In Mr. Nicol Baird's lengthy contribution in this week's "GAS JOURNAL" on the economics of benzole recovery, leaving out his personal attacks upon myself, which I will deal with later, the main theme in his objection to benzole recovery is the extra coke produced.

In my previous letter I stated that a high coke yield was desirable, assuming the costs per therm of gas were not increased, and I need scarcely remind him that efficiency in heating the settings, the installation of waste heat boilers, &c., have all the same final object—that of increasing the "coke for sale" per ton of coal carbonized.

The disposal of "coke for sale" is an entirely separate problem and, as I have previously stated, it is my opinion that the selling price is more influenced by competitive fuels than by the stocks of individual undertakings, and unilateral curtailments of coke production is a sacrifice for the benefit of *all* the fuel industries and is not justified.

Now with regard to benzole recovery on the one hand and the alternative of leaving benzole in the gas to carburet the extra water gas made in vertical retorts in order to swell the "make per ton" figure.

Let us take Mr. Waller's figures showing a drop of 10 therms per ton for a benzole recovery of 2 gallons.

Mr. Baird was quite happy to manipulate these figures to show that the return for benzole was equivalent to 1·116d. per therm. A figure obtained by Mr. Baird *crediting benzole at 11d. per gallon.*

What are the facts?

PRODUCTION COSTS—MATERIALS.

*10 Therms of Water Gas Carburetted with Benzole.*

| | d. |
|---|---|
| Steam required, 75 lb. at 15d. per 1,000 lb. .. .. = | 1·12 |
| Coke gasified, 40 lb. at 22s. per ton.. .. .. .. = | 4·7 |
| Benzole used, 2 gallons at 10d. per gallon net (Waller's figures).. .. .. .. .. .. .. .. = | 20·0 |
| Total cost for 10 therms .. .. .. | 25·82d. |

*10 Therms of Straight Coal Gas.*

Net cost of coal, 8s. 2d. per ton—

10 therms cost $\frac{98 \times 10}{72}$ .. .. .. .. .. = 13·6d.

I may add that in the "costing" of the 10 therms produced by water gas carburetted with benzole there has been no account taken of any extra coke consumed in the producer to supply heat for the water gas reaction, and I would point out that when the calorific value of "vertical" gas falls below 480 B.Th.U., thereabouts, when steaming, all the useful sensible heat from the cooling of the coke has been used up and for further water gas production it will be necessary to supply heat from the producer for external heating of the retort, which is not a very effective method of heating coke for water gas manufacture. For the above reasons, and in the absence of qualifications, I entirely disagree with Mr. Baird that water gas made *in situ* in vertical retorts can yield nothing but profit to the Industry.

To return to Mr. Baird's criticism of my figures for "coke for sale" per ton of coal when recovering benzole.

I agree with the figure he gives of 12·5 cwt./ton when the customer is the benzole therm.

The figures used to obtain the 14·8 cwt./ton are the *extra* coal carbonized and the *extra* "coke for sale" over the gaseous therm customer when the customer is the benzole therm. I must apologize for not making it clearer in my last letter.

*Purification Costs.*—The amount at issue is £6, and if I followed Mr. Baird's example I would say take it *in toto*, £6 is too small to effect the argument either way, but having noted his italics I would suggest that in the absence of benzole recovery the extra water gas made contains sulphur compounds, and, from figures I have seen, the small increase in the initial $H_2S$ content of the foul gas when benzole recovery is being practised, compared with gas where only dilution with water gas is operated, is not more than the variation in $H_2S$ content brought about by using different coals, and in both cases, with or without benzole recovery, the volume of gas to be purified is, for all practical purposes, the same.

*Extra Revenue to Steam Raising Plant.*—I still maintain that the extra steam required for the benzole plant enables full use to be made of the potential capacity of the waste heat boiler and provides an outlet on the Lancashire boilers for any low-grade fuel about the works. The steam is debited against benzole recovery and is a financial asset to the steam-raising plant.

In conclusion, and in the hope that Mr. Baird may be persuaded to see some of the advantages of benzole recovery, I would suggest that the revenue from an approximately 5% increase on the present gaseous thermal output without adding to the expenses of storage, office, distribution, management, meters, sales activities, accounts department, &c., should be a very attractive proposition, and finally, do not the production costs, with or without benzole recovery, indicate the enormous gains to be obtained by increasing revenue? And benzole recovery is one way of doing this, which can be put into immediate operation.

Yours, &c.,
F. FIRTH.

*Leeds Corporation Gas Department,*
*March 26, 1939.*

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SIR,—Mr. Baird invites me, in his letter published in last week's "JOURNAL," to plunge deeper into the benzole controversy. My idea in writing in the first place was to illustrate from my own experience with two works in the same district and with similar coal how circumstances, plant, and local conditions affect the final result and to emphasize the necessity of complete balance-sheets being prepared on a given output of gas before making a decision. To say it pays because it provides an additional consumer or is useful as a diluting medium goes nowhere without other relevant facts being taken into account.

To obtain the figures mentioned in my last letter, I prepared five balance-sheets for each of the two works, based on our working results with and without benzole extraction, advancing by steps of ½ a gallon per ton up to 2½ gallons. To give these in full would occupy too much space in your columns. I will, however, give the following extracts by way of illustration:

| Basis, 5,000 Therms. | Works A. Continuous Verticals. | | Works B. Intermittent Verticals. | |
|---|---|---|---|---|
| | No Benzole. | 2 Gallons per Ton. | No Benzole. | 2 Gallons per Ton. |
| Thermal yield before washing .. .. .. | 78 | 74 | 87 | 84 |
| Quality before washing, B.Th.U. .. .. .. | 505 | 521 | 505 | 521 |
| Quality after washing, B.Th.U. .. .. | — | 505 | — | 505 |
| Final thermal yield .. | — | 70·8 | — | 80·8 |
| Coke for sale per ton of coal out of works, cwt. .. | 9 | 9½ | 7 | 7·8 |
| Tar made per ton, gallons.. | 18 | 16 | 17 | 15 |
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Coal at 33s. 4d. a ton .. | 106 16 8 | 117 13 1 | 94 17 6 | 101 16 2 |
| Repairs retorts at 1s. per ton .. .. .. | 3 4 1 | 3 10 7 | 2 17 6 | 3 1 8 |
| | 110 0 9 | 121 3 8 | 97 15 0 | 104 17 10 |
| *Less*—Coke at 32s. 6d. a ton | 46 17 5 | 54 9 11 | 31 3 11 | 37 5 11 |
| " Tar at 2d. a gallon.. | 9 12 4 | 9 8 3 | 8 2 11 | 7 14 3 |
| Net cost for 5,000 therms.. | £53 11 0 | £57 5 6 | £58 8 2 | £59 17 8 |
| Extra cost over ordinary working .. .. .. | — | 3 14 6 | — | 1 9 6 |
| Extra annual cost .. .. | — | £558 15 0* | — | £118 0 0† |

* For 750,000 therms. † For 400,000 therms.

| | £ s. d. | £ s. d. |
|---|---|---|
| Extra annual cost .. .. | 558 15 0 | 118 0 0 |
| Interest and depreciation, 12½% .. .. .. | 75 0 0 | 60 0 0 |
| Labour .. .. .. | 19 12 0 | 19 12 0 |
| Steam and water (coke for sale allows for these, as steam and pumping mean extra coke used) .. | — | Steam .. .. — |
| | | Water (bought) 10 1 0 |
| | | Maintenance .. 19 8 6 |
| Maintenance .. .. | 28 12 0 | |
| | £681 19 0 | £227 1 0 |
| Benzole produced, gallons.. | 21,150 | 9,872 |
| Cost per gallon (65% at 120° C.) .. .. | 7·73d. | 5·52d. |
| Present interim price .. | 10·5d. | 10·5d. |
| Profit per gallon .. .. | 2·77d. | 4·98d. |

Carbonizing wages, salaries, purification, and repairs to works plant other than retorts remain practically the same in our case whether benzole is extracted or not. Any small variations in these items scarcely affect the result. The higher yield of coke per ton when benzole washing results from having to increase the throughput of the retorts to make richer gas suitable for

washing down to the declared calorific value, while the tar yield is reduced due to less steaming being possible.

In answer to Mr. Baird's question, we work to a standard of 65% at 120° C. and therefore have more heavy fractions than he has at 82%. After increasing the cooling surface for oil at the smaller works with the intermittent verticals, we were able to increase the yield from 1½ gallons per ton to 2¼ gallons, while the quality also improved from 67% up to 74% at 120° C. This was due to getting the oil temperature down before entering the scrubber.

There are many more points one might deal with but I think the above show that each case must be dealt with on its merits.

Yours, &c.,
FRANK H. ROBINSON.

*Bishops Stortford.*
*March 27, 1939.*

# News of the Week

**The Great Grimsby Gas Company** announce that they are compelled to increase the price of gas to 8·2d. per therm.

**Demonstrations** are being held during this week for the first time in the new gas headquarters of the Nottingham Corporation Gas Department in Parliament Street.

**Carburetted Water Gas Plant,** having a daily capacity of 5 million cu.ft., has been ordered from Messrs. Humphreys & Glasgow, Ltd., by the Glasgow Gas Department.

**Gas Appliances of Many Types** are being shown on the five stands occupied by the Maidstone Gas Company at the Kent County Home and Fashions Exhibition at Maidstone.

**The Result of Linking-Up** with the mainland for "Gas Cooker Fortnight" at Guernsey, and this despite the fact that the opponents of the Guernsey Gas Light Company were running a series of cookery demonstrations during the first week, were as follows: Cookers 54, fires 3, washing machines 3, and water heaters 7.

**Notice of an Increase in Capital** is given by the Carmarthen Gas Company, who intend to apply to the Board of Trade for a Special Order under Section I of the Gas Undertakings Act, 1920. The Company seeks *inter alia* authority to raise at any time during a period of three years after the date on which the Order comes into operation additional share capital not exceeding £6,000.

**An Exhibition and Cookery Demonstrations** are being held this week by the Canterbury Gas and Water Company at the Foresters' Hall, High Street, Canterbury. The opening ceremony was performed on Monday afternoon by the Chairman of the Company, Mr. Silas Williamson, J.P. Miss P. M. Allen, *Diplomée*, N.S.T.C.D.S., is giving two lectures, afternoon and evening, each day, until Saturday, which is the final day. A cake-baking competition has been organized in connexion with the exhibition.

**The Calorific Value** of the gas to be supplied by the Whitstable Gas and Coke Company on and after April 1 will be 500 B.Th.U. per cu.ft.

**In Turning Down a Request** by the Grampian Electricity Supply Company that electricity be introduced in a new housing scheme, the Cullen Town Council unanimously decided to install gas for lighting and cooking and to fit wash boilers as in a previous scheme.

**An Increase in the Price of Gas** by 5d. per 1,000 cu.ft. is to be recommended by the Dewsbury Gas Committee to the next meeting of the Town Council. The increase makes the charge 1s. 8d. per 1,000 cu.ft. for rateable value consumers and 4s. 7d. per 1,000 cu.ft. for flat rate consumers.

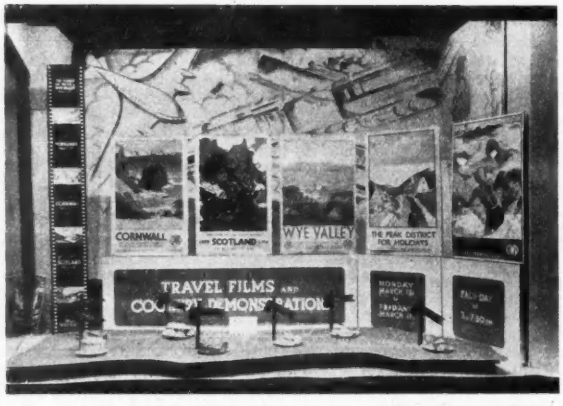
**To Mark the 50,000th Gas Consumer** the Mayor of Huddersfield (Alderman Fred Lawton) last week presented a new gas cooker to Mr. and Mrs. N. Hirst, of Berry Brow. In making the presentation the Mayor spoke of the steady increase in gas business, and said that in the past ten years the sale of gas appliances at Huddersfield had increased by 3,000 per year to nearly 70,000.

**The Swedish Minister**, M. Bjorn Prytz, will speak on "New Aspects of Labour Relations in Sweden," at the monthly lunch of the Industrial Co-partnership Association to be held at the Northumberland Rooms, Northumberland Avenue, W.C. 2, tomorrow at 1 p.m. Monsieur Prytz speaks with special authority on this subject as before coming to London last year to represent his country he was the Managing Director of S.K.F., the Swedish ball-bearing manufacturers of international repute. The Rt. Hon. Viscount Samuel, G.C.B., one of the Vice-Presidents of the Association, will preside. Application for tickets (price 4s.) should be made to the Secretary, the Industrial Co-partnership Association, 36, Victoria Street, S.W. 1.

## Travel-Cookery Demonstrations

### Novel Attraction at Leicester

A unique attraction was held at the City of Leicester Gas Department Demonstration Showroom during Gas Cooker Fortnight and took the form of Travel-Cookery Demonstrations, the Demonstrator being Miss Dorothy Scott, *Diplomée*, N.T.S.C., Chief Demonstrator of the Parkinson Stove Company, Ltd.




Films kindly loaned by the Railway Companies were shown of various British centres renowned for their local beauty as well as for their delectable dishes, such as Cornwall for pasties and splits, Scotland for shortcake and oatmeal flap-jacks, and the Peak District for Bakewell tarts, not forgetting on the return the traditional pork pie of Leicestershire. The idea proved most popular and crowded houses were the rule throughout the whole series of demonstrations.

Special programmes of the demonstrations designed like a travelling case and showing attractive scenic views inside were issued in advance, so that the public could choose the excursion into the realms of æsthetic beauty and culinary art which most appealed.

## Wrexham Celebrates Centenary

### War Department Contract

A hundred years of gas was celebrated at the recent annual meeting of the Directors of the Wrexham Gas Company. The Company was formed in 1839 under the title of "The Wrexham Gas and Coke Company."

Dr. J. E. H. Davies, who presided at the meeting, said the Company had come to terms with the War Department for the supply of gas under a long period contract of 21 years for the whole of the heating and cooking requirements at the local barracks. The apparatus now in course of installation included central heating boilers for cooking and heating, gas ranges, and baking ovens, which when completed would entail a substantial addition to production.

It has been decided to install boosting plant at the Works to enable the pressure to be increased at times of abnormal demand. This plant will be brought into use in a few weeks' time.

# Cambridge Apply for Extended Limits

## Gas Regulation Acts Enquiry

At the offices of the Board of Trade in London on Friday, March 24, Mr. R. L. Sich, on behalf of the Director of Gas Administration, held an enquiry under the Gas Regulation Acts, 1920 to 1934, into an application by the Cambridge University and Town Gas Light Company for an Order authorizing an extension of the present limits of supply. The proceedings occupied only a short time, as the only opposition came from the Chesterton Rural District Council which complained of one of the proposed differentials but was unable to bring any evidence to support their view that this was excessive. The Company was represented by Mr. Halliwell (Messrs. Rees & Frere, Parliamentary Agents) and the Chesterton Rural District Council sent their Clerk, Mr. Hayward.

Mr. HALLIWELL explained that the object of the Draft Order was to extend the area of supply and to charge a differential of 2·5d. per therm in some parts and 5d. per therm in others. It was contended by the opposition that 5d. per therm was an unfair differential having regard to the circumstances that some of the parishes in which the 2·5d. differential was proposed were farther from Cambridge than the parishes in which the 5d. differential was intended.

Mr. *J. H. Rioch* (Engineer and Manager of the Cambridge University and Town Gaslight Company) said the differentials had been based on the cost of the mains to supply the various parishes and the probable demand in each. In some parts the probable demand for some time ahead was likely to be quite small, but the differentials, whether they were 2½d. or 5d., would only be applied as long as was necessary, for it was obviously to the disadvantage of the Company to apply a differential in any area which would have the effect of retarding development. The whole experience of the Company had shown this to be the case, and, indeed, differentials had been reduced in some of the existing area of supply. In the beginning, however, it was necessary to have such a differential as would safeguard the Company against the cost of the necessary main.

Mr. HAYWARD in the course of some cross-examination of Mr. Rioch put the point that in order to reach some of the parts where the 5d. differential would be applied the Company would be passing through districts where the 2½d. differential existed, and he contended that it was not reasonable to ask 5d. in such circumstances. Moreover, he alleged that in some parts where the 2½d. differential was already applied there were quite long lengths of unremunerative mains, and therefore the Chesterton Rural District Council saw no reason for such a high differential as 5d. where it was now proposed.

The INSPECTOR asked if Mr. Hayward had any evidence to prove that the mains he had referred to were unremunerative.

Mr. HAYWARD said he had not, but added that he based his assertion on the fact that the mains he had in mind ran through agricultural land where there were no houses at all. He also asked the Inspector to insert in the Order a provision that gas should be provided in the extended area within a specified time.

The INSPECTOR replied that that would be *ultra vires*.

Mr. HAYWARD replied that his Council thought it was a reasonable request, nevertheless.

Mr. *Rioch* said it might be that at the present time some mains might be regarded as unremunerative as regards certain portions of them, but it was necessary to lay them in order to reach other parts, and there was always the possibility of development all along the routes.

Mr. HAYWARD, dealing with the proposals of the Company to lay radiating mains from the existing area to link up with the proposed additions, suggested it would be cheaper to lay a ring main.

Mr. *Rioch* gave figures showing that it would actually cost more, but added that in any case, when the time came, the Company would obviously lay the mains in the cheapest possible manner.

The enquiry then closed.

# At Birmingham Trades Exhibition

**At the Bingley Hall, Birmingham, where the National Trades Exhibition is now in full swing, the Birmingham Gas Department have this striking stand. During the first fortnight the Department have received orders for 55 cookers, 15 fires and radiators, 12 water heaters, and six washing machines and boilers. The influence of Gas Cooker fortnight will be noticed in the satisfactory cooker sales. The closing date is April 15.**

# Western Junior Gas Association

## Honorary Members' Prizes

The Western Junior Gas Association Honorary Members' Prizes for Papers given by members during the 1937-38 session have been awarded as follows:

*First Prize.*—Mr. A. G. Holtham (Cheltenham and District Gas Company) for his Paper on "Rural Gas Services."

*Second Prize.*—Mr. F. A. Butt (Torquay and Paignton Gas Company) for his Paper on "Some Practical and Theoretical Aspects of Crude Benzole Recovery."

These Papers were dealt with, respectively, in our issues of Feb. 9, 1938, on Dec. 15, 1937.

# King Alfred Looks On!

A happy thought prompted the selection of this site in Wantage for the travelling showroom of Messrs. R. & A. Main, Ltd. Here the historic figure of King Alfred the Great, flanked by modern gas lamps, gazes down and meditates on what a fine job he would have made of those cakes had he been living in an age when, thanks to automatically-controlled gas cookers, food can be cooked perfectly without attention.

# Wandsworth Company's Home Service Association

## Third Annual Party

A large and enthusiastic audience, numbering more than 450, attended the Third Annual Party of the Wandsworth and District Gas Company's Home Service Association, held at the Assembly Rooms, Surbiton, on March 10. Mrs. C. M. Croft (wife of the Chief Engineer and General Manager of the Company), the President of the Association, presided.

Introduced by Mr. A. G. C. Adams (the Company's Publicity Officer), Mrs. Croft expressed her pleasure at so excellent a gathering, and reminded her hearers that she took the keenest possible interest in their activities. Mrs. Croft then gave an outline of the growth of the H.S.A., which, founded in 1935, opened its first branch at Worcester Park in that year, and under the continuous chairmanship of Mrs. M. A. Carpenter, it had grown until its membership to-day was 155. The next branch was inaugurated at Epsom, under the chairmanship of Mrs. Candy. Its roll of members to-day was 136. Then followed Sutton and Cheam with Mrs. Fielder as Chairman, its members totalling 138, Kingston with 106, Wimbledon with 112, and the last branch to be opened, Leatherhead, in 1937, had to-day the greatest number of members, their total being 166.

Some of the large gathering at the Wandsworth H.S.A. Party.

Mrs. Croft went on to say that they were striving to reach 2,500 before very long. She was sorry there were so few halls that would accommodate them in the various districts. The Home Service Association was anxious to cater for even greater numbers, and it was hoped that the requisite accommodation would soon be forthcoming, enabling the H.S.A. to be of even greater service to the public.

Miss E. L. Webster then introduced Mrs. D. D. Cottington Taylor, Director of The Good Housekeeping Institute. Miss Webster pointed out that Mrs. Cottington Taylor had the difficult job of selecting the ten best cakes out of the 188 entered.

While the judging was taking place Jean Harley and George Barker entertained the members, who in turn were followed by Muriel Gale who sang two songs. The next item on the programme was a Cinematograph Lecture entitled "The Romance of the Silver Thames" by the Port of London Authority.

Then followed the tea interval, after which Mrs. Cottington Taylor explained why the successful winners succeeded in the cake-making competition.

The bag presented to the member obtaining the largest number of new members was won by Miss Rudd, who enrolled 33 new members during the last year. Mrs. Croft promised to give a cup next year to the Branch that enrolled the largest number of new members, and an individual present to the member with the largest total.

Mr. A. G. C. Adams, addressing the members and guests, said: "We want every one of you to feel that this Home Service Association is especially for your benefit. We want you to come along with any little problem that you have to solve and let us help you all we can. We now have over 800 members and I do ask you all to "Think Gas" and believe in it. When you have a heating problem always ask yourself "Can Gas Do It?" If you're doubtful get in touch with one of our showrooms and let them settle the problem for you. Then again, if you have any cooking or laundering problems seek the advice of our lady demonstrators at the showrooms, they are always there waiting to help you. Our aim is to raise our membership to at least 2,000 by the time we meet again next year."

The prizes were presented by Mrs. C. M. Croft, who congratulated the winners.

# Hawick Works Visited by Tar Experts

## Tar Road Inspected

The Hawick Gas Company, Ltd., had as their guests on March 17 a gathering of about forty, including Members of the Roxburghshire County Council Road Board, Mr. W. H. Budgett, Scottish Divisional Engineer, Ministry of Transport, Colonel A. Forbes, County Surveyor of Roxburghshire, Mr. H. Scarth, Clerk to the Roxburghshire County Council, and several leading Road Surveyors in the South of Scotland. Mr. R. W. Cowie and Mr. Robert Cowie, Junior, Joint Managers, received the guests at their Works.

Mr. Robert Cowie, Junior, conducted the party round the Works, explaining the various steps in gas manufacture and the extraction of by-products. Particular attention was paid by the visitors to the extraction of benzole and to the tar distillation plant. It was explained that the tar plant was built in 1920, and consisted then of one tar still and storage tanks. Now three large tanks can store over 500,000 gallons of crude tar and there are three continuous type tar stills with a daily output of 8,000 gallons of road tar or bitumen mixture, bitumen being imported in heated tanks, pumped into bitumen storage tanks, and thence fed by gravity to the mixing plant. Four road tar storage tanks have a capacity of 20,000 gallons. Fitted with heating coils and agitators, they are able to comply with sudden demands from squads on the roads. There are loading gantries which allow of from 80 to 100 barrels being filled hourly, while high-level and low-level railway sidings facilitate handling and, in addition, the Company has four 3-ton motor trucks to convey tar to its destination.

The party subsequently inspected an experimental length of two-coat tarmacadam laid two years ago by the Roxburghshire County Council in co-operation with the British Road Tar Association. The road is part of Route A.7 between Hawick and Edinburgh, and though the laying of the material was delayed owing to falls of snow, and has since been subjected to heavy traffic, its condition was regarded as excellent.

Mr. W. E. Cone, Technical Adviser to the British Road Tar Association, gave a brief description of the manufacture and laying of the material and drew attention to the very satisfactory "riding" and non-skid qualities of the surface. Great interest was evinced in the road, and Mr. Cone handed copies of the Specification used in carrying out the work to those present.

At a luncheon held subsequently in the Tower Hotel, Mr. J. Boyd Sime, Chairman of the Company, presided and welcomed the guests. He gave a brief sketch of the history of the Company, pointing out that it came into existence in 1830, coal at that time being carried to the gas-works by ponies, as there was no railway. New gas-works had been erected since then, and their plant was as up-to-date and efficient as possible. With regard to their tar distillation plant, they welcomed any advice from those in the Industry. They had had the opportunity of inspecting that morning a length of road laid with a compound made in the Hawick Works. In that job they were greatly helped by Mr. W. E. Cone, Technical Adviser to the B.R.T.A.

Following the luncheon the British Road Tar Association's film "Tar Carpets" was shown with a running commentary by Mr. Cone.

Mr. W. H. Budgett, Scottish Divisional Engineer, Ministry of Transport, proposed a vote of thanks to the Directors of the Hawick Gas Company for their hospitality.

Following the showing of the film, Mr. Budgett initiated the discussion and raised the question of the use of primers for tar, the proper grading of the aggregate before the binder was applied, and various other points. A number of questions were also raised by various speakers, to which Mr. Cone replied.

A vote of thanks to Mr. Cone, proposed by Mr. J. B. Stewart, of Roxburgh County Road Board, concluded the proceedings, the delegates before leaving being entertained at tea.

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# Birmingham Retort Welding Process

## Equipment Standardized

It will be remembered that the Birmingham Retort Welding Process was fully described by Messrs. Rhead, Hawthorn, and Deacon in their Paper before The Institution of Gas Engineers last autumn.

The equipment has now been standardized, and arrangements have been made for its manufacture and sale. Its development and use are being supervised by a Committee consisting of representatives of the City of Birmingham Gas Department, the Woodall-Duckham Companies, and West's Gas Improvement Company, Ltd.

Enquiries should be addressed to either of the above contracting firms.

# The Southern Association of Gas Engineers and Managers

The Annual General Meeting of the Southern Association of Gas Engineers and Managers was held on Friday, March 24, at the Hotel Victoria, Northumberland Avenue, W.C. 2—the PRESIDENT (Mr. F. Blackburn, of the Plymouth Corporation Gas Department) in the chair.

The Minutes of the last meeting, as published in the "GAS JOURNAL," were confirmed, and on the proposition of the PRESIDENT, seconded by the VICE-PRESIDENT (Mr. G. le B. Diamond, of Folkestone), the Report of the General Committee was unanimously approved.

## New Members.

The following were thereafter elected to membership of the Association on the proposition of the PRESIDENT, seconded by the VICE-PRESIDENT:

S. A. Tennant (Lea Bridge).
R. T. de Gruchy (Gas Light and Coke).
J. E. Wilkes (Brixham).
J. L. Mayes (Bridport).
A. Tran (Reading).
S. H. Edwards (Southampton).

The PRESIDENT extended a cordial welcome to these gentlemen.

On the proposition of Mr. D. C. CROSS (Lea Bridge), seconded by Mr. L. J. LANGFORD (Tunbridge Wells), the President was unanimously elected to represent the Association on the Council of The Institution of Gas Engineers.

The PRESIDENT then presented to Mr. Cross an inscribed silver salver as a memento of his year of office, for which Mr. CROSS duly returned thanks, saying how much he appreciated a memento by which he would remember the honour they had conferred upon him in electing him their President last year.

## The Institution Benevolent Fund.

Mr. C. VALON BENNETT (Rochester) made an appeal for support of The Institution of Gas Engineers Benevolent Fund. He observed that it was desirable that all the District Associations should come into closer contact with the work of the Benevolent Fund Committee, and he understood that it had been suggested that the District Associations should appoint an Hon. Secretary to attend the meetings of this Committee. He went on to draw attention to the arrangement which, with the co-operation of the Inland Revenue Authorities, will enable the Fund to benefit by the amount of income-tax on annual contributions. A few particulars relating to this matter are set out below:

An annual contribution to a charity is not the income of the charity for income-tax purposes, and the charity is thus unable to reclaim income-tax on such income. If, however, the contributor enters into a Deed of Covenant to pay to a charity a fixed annual sum for seven years (or during lifetime, whichever is the shorter period) out of income already taxed, then the amount legally becomes the income of the charity, and income-tax paid thereon by the contributor can be reclaimed by the charity from the Inland Revenue Authorities. A Certificate with the contributor's signature, stating that income-tax on the amount has been paid, will enable the Benevolent Fund to reclaim the tax.

A contributor remitting, for example, £1 1s., will sign a Certificate of Deduction of Income-Tax (which will be provided by the Hon. Secretary of the Benevolent Fund) for 7s. 11d. (on the basis of Income-Tax at 5s. 6d. in the £). Thus, the Benevolent Fund will be benefited by approximately an additional 38%. Changes in the rate of income-tax would not vary the amount payable by the contributor, but would increase, or decrease, the gross amount, and consequently the amount of tax which the Benevolent Fund could reclaim. If the contributor is liable to sur-tax, not only will the Benevolent Fund benefit (by recovery of income-tax), but he himself will obtain relief by the arrangement, because he will then be entitled to deduct, as a "Charge on Income," the amount of the contribution, *plus* income-tax thereon, in arriving at his taxable income for sur-tax purposes.

Those who are good enough to assist the Benevolent Fund by signing Deeds will be put to no further trouble, as the making of claims upon the Inland Revenue Department and the recovery of income-tax will be undertaken by the Committee of Management of the Benevolent Fund. Stamp Duty will be paid by the Fund.

The need of the Benevolent Fund, said Mr. Valon Bennett, was great, and if they served on the Management Committee as he had done they would know of the heartrending cases which came before them. They might have examined the Benevolent Fund Accounts and noticed that they did not spend the amount of money which was received during the year. This was a policy which the Committee had purposely followed. It was because they had found it necessary in years gone by, and perhaps it would be more necessary in the future, to build up a fund and invest it so that in those years when donations as distinct from subscriptions fell there would still be sufficient money in the Fund to enable the Committee to do something for all those who appealed to them. In the past the Committee had never felt able to pay adequate sums to those who had asked for relief. He appealed, therefore, to the members of the Southern Association to act as ambassadors for the new scheme and do all they could to get their colleagues to subscribe. He emphasized that the signing of the Deed of Covenant made no call, in the event of death, upon their estate. A method he himself adopted was, whenever any friend in the Industry passed away, instead of sending flowers he sent an equivalent amount to the Benevolent Fund and thus honoured their memory in a practical way.

Mr. R. ROBERTSON (President of The Institution of Gas Engineers) supported Mr. Valon Bennett's appeal. It had been felt at Headquarters, he said, that no more could be done than they had done in the past, and that the only way to improve the finances of the Fund was to enlist the support of the Districts; for that reason a special meeting of the Fund had been arranged for April to which the Secretaries of the Districts would be invited. In this way they hoped to enlist the sympathetic help of the Districts.

## Presidential Address.

Mr. BLACKBURN then delivered his Presidential Address, which will be found on other pages of this issue of the "JOURNAL."

On the proposition of Mr. R. C. TAYLOR (Torquay), seconded by Mr. W. E. DEAN (Exmouth), a hearty vote of thanks was accorded to the President for his Address, and this concluded the meeting.

## ASSOCIATION LUNCHEON.

Prior to the Annual General Meeting, the Association held their luncheon at the Hotel Victoria—the PRESIDENT (Mr. F. Blackburn) presiding.

The Loyal Toast having been honoured, the VICE-PRESIDENT (Mr. G. le B. Diamond, of Folkestone) proposed the health of "The Visitors." He referred first with pleasure to the presence

of Alderman Tozer, J.P., the Chairman of the Plymouth Corporation Gas Committee since 1923, who had given many years of devoted service to his fellow citizens in Plymouth. His father before him had likewise been Chairman of the Gas Committee, so that father and son together had given thirty years of distinguished service to the City—which was no mean record, for it was a service which was given freely without fee or reward. Alderman Tozer and his father had shown great wisdom in their choice of men; otherwise their esteemed President would not have been their Gas Engineer. Alderman Tozer also enjoyed the reputation of having been Plymouth's youngest Mayor. They very much appreciated his presence on that occasion and his support of their President. Mr. Diamond also referred with pleasure to the presence of Mr. Robert Robertson, President of The Institution of Gas Engineers. He was not altogether a visitor, for he was one of their own members, and his election to the Presidency of the Institution was a source of considerable gratification to the Association. They also had with them Mr. Damon, Chief Inspector of Alkali Works, and on their behalf he gave him a very hearty welcome, as he did also to the representatives of the National Bodies, including Mr. Braunholtz (Secretary of the Institution), Mr. E. J. Fottrell (Joint Manager of the National Gas Council), Mr. Alexander Tran and Mr. S. C. Waldock (Presidents of the two Junior Associations associated with the Southern Association), and, finally, the representatives of the Technical Press, whom they all thanked for the good services they rendered to the Gas Industry. He coupled with the toast the name of Alderman Tozer.

Alderman TOZER said it gave him considerable pleasure to have the opportunity of responding to the toast, and he felt singularly honoured at being picked out as their principal guest. He looked upon it also as a privilege to be present on such an occasion—when his Corporation's Gas Engineer and Manager was President of their Association. He took this opportunity not only of congratulating Mr. Blackburn on the position with which they had honoured him, but also of congratulating the Association on the choice they had made. As Mr. Diamond had said, he had been Chairman of the Plymouth Corporation Gas Committee for a number of years; indeed, it was during his Chairmanship that Mr. Blackburn was first introduced to Plymouth and it was in no small measure due to his judgment that Mr. Blackburn was selected for the position of Assistant Engineer and Manager, and, not long after, to the position of Engineer and Manager. He could assure them, therefore, that it was a source of great gratification to him to know that the choice they had made was not only upheld in the City of Plymouth but also in their important Association.

### Gas Progress at Plymouth.

Though he was not himself actively associated with the Gas Industry, went on Alderman Tozer, he could claim to have had some connexion with the Industry, as his late father and himself had held the position of Chairman of the Devonport Gas Committee and later the Plymouth Gas Committee consecutively for thirty years. During that period the Gas Undertaking had made very considerable progress; and it might be of interest to them to know that in 1909 their output was approximately 270 million cu.ft. and their consumers numbered 9,000, whereas at the present time their output amounted to no less than 925 millions per annum, supplied to 28,000 *satisfied* consumers. It was during the years that their President had been in charge of the Undertaking that the most conspicuous progress had been made; and he had no hesitation in saying that it was in no small measure due to Mr. Blackburn's personal interest and activity that they had reached this very satisfactory state of affairs. The figures he had mentioned represented an increase of 32 millions, or 3·73%, over that of the previous year, and was the largest output in the history of the Undertaking. At Mr. Blackburn's instigation the benzole plant had been installed—and that had been an unqualified success. During the time that plant had been in operation over a million gallons of crude benzole had been manufactured and sold, and during the past twelve months they had sold over 150,000 gallons. The total turnover of the Undertaking was more than £200,000 during the past year, and it might be a matter of interest to them to know that the total capital charges amounted to only 14½% of that sum. They claimed that not only did they provide gas up to the requisite standard, but they prided themselves that they were able to supply those satisfied consumers at a price which was one of the lowest in the whole country—namely, a flat rate of 2s. 6d. per 1,000 cu.ft. In spite of the increased cost of coal they had every reason to believe that during the next twelve months they would maintain that low price, and, provided there was no further increase in costs in the near future they had every hope that in a few years they would be able to reduce this figure. In December of last year they had established four records in output in one week; in a single day nearly 5 million cu.ft. of gas were made. While he was not going to suggest that Mr. Blackburn was solely responsible for that output—because climatic conditions were such as to encourage people to make increased use of their commodity—nevertheless it was Mr. Blackburn who saw to it that it was possible to meet that exceptional demand.

They were fortunate, continued Alderman Tozer, in having such an excellent President, just as they in Plymouth were fortunate in having the services of such a splendid Engineer. He felt that there was a great future for the Gas Industry. He realized that that they were faced with keen competition, but he maintained that there would always be a call for gas—for there were services which could be given better by gas than by any other means. In conclusion, Alderman Tozer thanked the Association on behalf of all the visitors for their hospitality and extended to them a cordial invitation to visit Plymouth on May 19. They would have the opportunity of seeing Mr. Blackburn's works, and everything would be done to give them a real West-country welcome.

### A Proud Record.

Mr. R. ROBERTSON, proposing the toast of "The Southern Association of Gas Engineers and Managers," observed that his pleasure in doing so was all the greater in that he was himself a member and had happy recollections of the kindnesses he had received from members on many occasions. During the sixty years of its existence the Southern Association had established a record of which it could be proud—not only in its membership, but also on the work it had done in the Gas Industry as a whole. It had been a pioneer of higher education and the improvement of gas technique and service, while it was always ready to provide a platform for the discussion of current problems of the day and for the airing of new and the defence of old views. Another pioneer step had been the holding of discussions *in camera* when views could be freely and frankly expressed for the benefit of all present. For this reason the members of the Southern Association were unusually well informed.

The Association, went on the President of the Institution, belied the dictum that "East is East and West is West and never the twain shall meet." The combination had been a happy one and a profitable one as well by reason of its representative character. It gave him added pleasure to propose this toast because their President was his neighbour and very good friend. His colleagues in the West were very proud indeed that they had been able to produce such a President. He had won for the Association the highest esteem and respect both in his own Town Council and among his colleagues on the Regional Committees.

The PRESIDENT, in reply, thanked Mr. Robertson for his remarks and expressed the hope that during his year of office he would be able to uphold the traditions of the Association and of the Gas Industry as a whole.

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## Sales Progress at Stroud

The Stroud Gas Light and Coke Company organized a very successful campaign in support of National Cooker Fortnight. During the fortnight no fewer than 43 gas cookers were disposed of, which speaks well for the forceful sales policy of the Stroud Company. In conjunction with Messrs. S. Flavel & Co., Ltd., of Leamington, practical cookery lectures were held in the Company's lecture theatre for the last week of the campaign. The lectures, which were exceptionally well attended, were conducted by Miss M. Harris, N.S.T.C., M.C.A. In addition to the cookers mentioned 49 gas fires, 26 boilers, and 19 water heaters were sold.

It is interesting to note that since Jan. 1, 1932, more than 3,436 enamelled gas cookers, 3,600 gas fires, 2,164 gas boilers, and 1,520 water heaters have been installed for cash and hire-purchase, and while many undertakings are finding their gas lighting business fast disappearing it is refreshing to find the Stroud Company increasing their load, over 19,600 lighting units having been installed since 1932.

The good relations which exist between builders and the Company are seen in the amount of business executed for builders during the past five years, which exceeds over £16,000. New contracts for 1939 include over 300 houses, 84 of which are to be equipped with coke fires in the living rooms, 2 panel suites and fires, boiler, cooker, gas iron, and lighting in each house, while for the remainder one panel suite and fire, boiler, cooker, and gas iron will be supplied and fitted. In addition, a contract for a large factory engaged in work of National importance is nearing completion, the installation consisting of overhead radiant panel heaters, wall type heaters for workshop heating, multi-point heaters for hot water, cooking and lighting equipment, and japanning oven, &c. A scheme is now being prepared for the heating of the entire factory by gravity-fed coke-fired boilers.

# Manchester District Association of Gas Engineers

**The 69th Annual Meeting of the Manchester District Association of Gas Engineers was held at the Midland Hotel, Manchester, on Friday, March 24—Mr. E. ASTBURY, M.I.Mech.E. (Liverpool), presiding.**

The HON. SECRETARY (Mr. H. Burton, of Shipley) having reported apologies for absence, it was unanimously resolved that letters of sympathy be sent to Mr. C. W. Ward (Wakefield), who was suffering from a broken leg and arm; and to Mr. J. Bridge (Elland), who was unwell, expressing the hope of the members of the Association for their speedy recovery.

The Minutes of the previous Meeting were approved, after which the following were elected to membership of the Association:

R. B. Glover (West's Gas Improvement Company, Ltd.).
S. T. Jones (Oswaldtwistle).
A. McDonald (Castleford).
J. H. Richmond (York).
J. E. Wakeford (Salford).

The Annual Report and Statement of Accounts was presented and adopted unanimously, as also were the Reports of the Commercial Sections, presented by Mr. J. D. Ashworth (Blackburn) and Mr. W. B. MacLusky (Halifax).

The following recommendations of the Committee were approved unanimously:

(*a*) That a donation of 10 guineas be granted to the Benevolent Fund of The Institution of Gas Engineers.

(*b*) That Mr. H. Singleton (Huddersfield) be appointed the Association's District Member on the Council of The Institution of Gas Engineers.

(*c*) That Messrs. T. Reynolds (Stockport) and H. Burton (Shipley) be appointed Representatives of the Association on the Councils of the Manchester and District, and Yorkshire Junior Gas Associations respectively.

(*d*) That Messrs. C. H. Bamber, A. L. Holton, T. Reynolds, and F. G. Shaw be appointed Representatives of the Association on the Lancashire District Gas Education Committee.

(*e*) That Messrs. H. Burton, J. Corrigan, G. E. Currier, and H. Singleton be appointed Representatives of the Association on the Yorkshire District Gas Education Committee.

(*f*) That Messrs. L. W. Harrison and R. N. Webb be appointed Representatives of the Association on the Barnsley Advisory Committee of Coke Oven and Chemical Work.

On the motion of Mr. Astbury, it was resolved that the members of the Association express their thanks to all those who had served on the various Committees. The personnel of the Committees remained the same, with the exception that Mr. C. H. Bamber took the place of Mr. E. Crowther on the Lancashire Education Committee.

## The New President.

Mr. ASTBURY, inducting the new President, said that Mr. Singleton was elected a member of the Association in October, 1916. He had served two periods as a member of the Committee, and had taken an active interest in the Yorkshire Education Committee. He had also represented the Association on various Committees of The Institution of Gas Engineers, and chiefly on the Lighting Committee. It was a great pleasure to him personally to induct Mr. Singleton to the Presidential Chair. He had always been a very keen member in all matters affecting the welfare of the Association, and a very successful year of office could be anticipated from him.

Mr. SINGLETON, having been invested with the Presidential Badge of the Association, said that his first pleasing duty was to present to Mr. Astbury the past-President's badge, which he hoped would serve as a memento of a very happy and memorable year of office.

Mr. ASTBURY acknowledged the presentation and thanked the Committee and the officers of the Association for the great support they had given him during his year of office.

## An Invitation to Huddersfield.

Councillor SIDNEY KAYE offered his personal congratulations to Mr. Singleton upon his induction into the Presidential Chair. He went on to refer to coal prices. He was in the unfortunate position in Huddersfield of being Chairman of the Coal Purchase Committee. The coal position at the present time was most serious, and the Gas Industry was taking autocratic price-fixing rather too easily; so long as this was the case he ventured to think that prices might not be stabilized as quickly as they ought to be. He suggested to the Association that it might be well worth considering the adoption of consolidated opposition. In conclusion, he had very great pleasure in extending to the members of the Association an invitation to hold their summer meeting at Huddersfield.

Mr. SINGLETON proposed, and Mr. C. S. SHAPLEY (Leeds) seconded that the invitation be most cordially accepted.

## Presidential Address.

Mr. SINGLETON then read his Presidential Address, which will be found on other pages of this issue.

## Vote of Thanks.

Mr. T. REYNOLDS (Stockport) proposed a hearty vote of thanks to Mr. Singleton for his interesting and informative Address. They were now on the point of forming an Association to make the selling of coke on a proper basis an accomplished fact. They were aiming to form a three-point agreement between the gas coke producers, the hard coke producers, and the merchants. But they must go further than that and educate the public in the proper use of coke. In his opinion the coke market had hardly been touched at all. If they were to be told what they had to pay for coal then they should turn round to the public and tell them they must use smokeless fuel. There was a tremendous field for the use of coke. When the Coke Association was formed it would be desirable to work on similar lines to the London and Counties Coke Association and if possible improve on their methods. They were absorbing all their coke. The position was entirely different in the north, but personally he could see no reason why the whole of the coke produced should not be sold within one's own boundaries instead of exporting it abroad. He would like to congratulate Mr. Singleton and his Committee on the good fortune they had had in extending their area of supply. It was no mean achievement to be able to show that in 20 years the area of supply had been increased fourfold. Obviously, this was to the advantage of the consumers who obtained cheaper gas and received better service. The majority of undertakings had had to adjust their prices of gas in order to meet the increased cost of coal. Huddersfield, according to their scale, had been able to keep their charges within very reasonable limits, and were, of course, attracting industry by keeping the charges down. Mr. Singleton had made some remarks concerning slum-clearance. This was a serious factor in most towns, and the Industry must strive to regain the loss by more intensive selling of apparatus per consumer.

Mr. J. E. L. COOPER (Yeadon) seconded the vote of thanks. The Address really dealt with some of the most important problems which beset the Gas Industry, including the rigid and non-commercial basis of the coal market and the urgent necessity for close and loyal co-operation in the coke market. Another question which had been dealt with was the important one of the reduction of sulphur content in gas so as to be able to promote the extended and safer use of flueless stoves. This provision would be one of the most effective ways of coping with the competition of light portable electric heaters. Reference had

been made to the progressive policy of Huddersfield in extending their area of supply. To put it tersely it was a matter of removing the weakest links from the chain of undertakings. The scale of gas charges set forth in the report was very interesting, and likewise its effect upon gas sales. He was pleased to notice that the Address emphasized the importance of retaining street lighting. In this connexion they all owed Mr. Singleton a debt of gratitude for the work he had recently carried out in the compilation of a comprehensive table of information on street lighting. It would be extremely useful to all gas engineers.

Mr. SINGLETON, in responding to the vote of thanks, acknowledged with gratitude the assistance he had received from members of his staff in the preparation of a considerable number of the details contained in the Address.

### Thanks to the Committee.

Mr. J. T. HAYNES (Stretford) proposed that a vote of thanks be accorded to the Committee and the officers of the Association for the work they had done on its behalf during the past year. The keynote of any Association, of course, was the Secretary, and he would like to congratulate Mr. Burton upon the way he upheld the dignity and the usefulness of his office after the manner of his predecessors over a very long period of years. With regard to the Committee it was often said that the best Committee was composed of two members, one of whom was always absent. The success of the Association, which had followed upon the deliberations of its Committee, rather gave the lie to that statement.

Mr. D. M. HENSHAW (Huddersfield) seconded the vote of thanks.

Mr. CHARLES WOOD (Hon. Member, Bradford) supported the vote of thanks, which was carried unanimously by acclamation.

Mr. H. BURTON, responding, said it seemed to have become the custom in recent years for the Hon. Secretary to do so. Both the Committee and himself had felt very happy during the past year because of the way they had been able to do their work. Anything they did they tried to do wholeheartedly and their reward was the appreciation and satisfaction of the members generally. They had had a particularly happy year under the guidance of Mr. Astbury. His courtesy and kindly manner had helped for smooth working. They looked forward to the next year under Mr. Singleton with a similar zest.

### THE ASSOCIATION LUNCHEON.

The meeting was preceded by a luncheon.

Mr. W. B. MCLUSKY, proposing the toast of "The President," said he had the pleasure of knowing Mr. Astbury for more than 32 years. He had been warned not to mention the Liverpool Gas-Works, but how could anyone mention Mr. Astbury and forget to refer to the Liverpool Gas Company? Mr. Astbury could not have chosen a better place for his training than the Liverpool area, and his experience there had caused him to be a most useful President for the Association. The thanks of the Association were more particularly due to him for his attendance upon that occasion because he had interrupted his honeymoon in order to be present.

Mr. E. ASTBURY, acknowledging the toast, thanked all the members for the support they had given him and also for the very enjoyable year of office they had enabled him to have. His thanks were also especially due to Mr. H. Burton, the Hon. Secretary, and the members of the Committee, and also for the congratulatory telegrams and good wishes for his future which he had received. If Mrs. Astbury had been present with them he was sure she would join with him in thanking them all for the good feeling they had displayed towards him and which had added so much to their joint happiness.

Mr. G. E. CURRIER (Bradford) proposed the toast of "The Guests." He was sure he was expressing the regret of all present at the inability of Sir Christopher Clayton and Mr. Sandon Stubbs to attend the meeting. The members of the Association owed a deep debt of gratitude to the Directors of the Liverpool Gas Company for the kindness they had shown to the Association during the period of office of their President, Mr. Astbury. They all had very happy memories of the visit to Liverpool last July when everything possible was done to make the trip thoroughly enjoyable.

He wished to mention Councillor F. Kaye (Chairman of the Huddersfield Corporation Gas Committee), to whom they extended a very hearty welcome. It was owing to Councillor Kaye's good offices, and those of his Committee, that they were looking forward with very great pleasure to having as their President next year Mr. Harold Singleton. He understood that the Huddersfield Gas Department had been served very ably by Mr. Singleton over a period of 25 to 30 years, and the one hope of the members of the Association was that his period of office as President of the Association would not be marred by any untoward happening internationally or otherwise.

Councillor SIDNEY KAYE, in responding to the toast, said that the Huddersfield Gas Committee desired no thanks for allowing Mr. Singleton to accept the office. The Committee considered that a very great honour had been conferred upon him, and if Mr. Singleton fulfilled his duties as President of the Association as well as he did those of the Management of the Huddersfield Gas Undertaking there would be no regrets upon the part of anyone at the end of the year.

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# Women's Gas Council

## Tottenham Branch Visit to Ascot Works.

Some 400 members of the Tottenham Company's Branches of the Women's Gas Council visited the Neasden Works of Ascot Gas Water Heaters, Ltd., on March 21. Motor coaches brought the guests from places as far afield as Ware and Hertford, and scenes reminiscent of the Aldershot Tattoo were witnessed at the Car Park when all were assembled.

A tour of the works by parties of 15 in charge of guides was the first item on the programme, each process of manufacture being explained in detail as they progressed.

Each party returning from the tour assembled in the new all-gas canteen, where tea was provided, followed by the film "Happy in the Morning," featuring Henry Hall and his Band, made for Ascot Gas Water Heaters, Ltd.

A Guessing Competition by means of un-named photographs projected on to a screen in which visitors were asked to name the section of the works represented, was followed by a programme of light music and community singing, various districts being matched against each other in this amusing diversion. The song used was the theme song of the Ascot film "Happy in the Morning." After some strenuous vocal efforts, the Hertford party emerged somewhat breathless as winners, powder compacts being presented as prizes to each member of the winning team, by Mr. Leopold Friedman (Assistant Managing Director and Chief Engineer of Ascot Gas Water Heaters, Ltd.).

After photographs of the assembly had been taken and Mr. R. Tennyson d'Eyncourt (Sales Superintendent of the Tottenham and District Gas Company) had proposed a vote of thanks to the Directors of Ascot Gas Water Heaters, Ltd., the parties returned to their coaches for the homeward journey.

The Competition winners were Mrs. Orchard and Miss Deness, both of Enfield, to whom "Ascot" sink water heaters were presented by Mr. R. Tennyson d'Eyncourt.

Some of the 400 members of the Tottenham Branches of the W.G.C. at the Neasden Works.

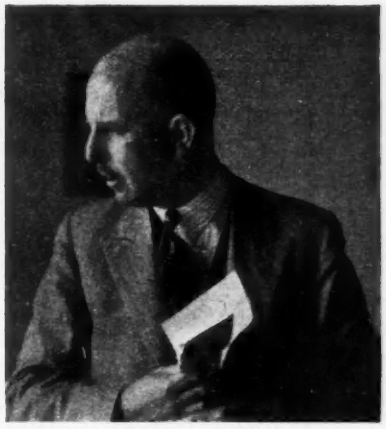
# The Southern Association of Gas Engineers and Managers

# Presidential Address

OF

**FRANK BLACKBURN, A.M.Inst.C.E., A.M.I.Mech.E.,**

Devonport.



THE PRESIDENT.

Mr. Frank Blackburn was born in Leeds, and received his technical education at the University of that City. After a period on the Technical Staff of Messrs. W. J. Jenkins, of Retford, he joined the Leeds Gas Department in 1924, serving as an Assistant at the Meadow Lane Works, and subsequently as Assistant Superintendent in the Meters, Stoves, and Stores Department of that Undertaking. In 1927 he was appointed Chief Assistant Engineer to the Plymouth Gas Department and to his present position as Engineer and General Manager in the following year. During the war he served with commissioned rank in the 2nd Battalion of the East Yorkshire Regiment, having 3½ years' active service overseas.

Delivered at the Annual General Meeting of the Association held at the Hotel Victoria, Northumberland Avenue, W.C. 2, on Friday, March 24.

When I was elected a Member of this Association, I little thought that I should have the privilege of to-day presenting this Address. As this honour is unfortunately reserved for the very few, you can, therefore, realize my pride and appreciation to you all for electing me the President of your Association.

I will do my utmost to uphold the high tradition of this office, which has been occupied by so many distinguished men in the Gas Industry. Our Association is the largest District Association, and is more than fortunate in possessing a most excellent Honorary Secretary. With his guidance and the help of the Members of the General Committee, I hope that 1939 will maintain the high standards of the past.

The Commercial Meetings held in both areas of our Association have been quite successful, although the number of members attending has left much to be desired. I am afraid that this is due in the main to the extraordinary number of meetings and conferences a gas engineer is expected to attend. While it appears to be impossible for the different organizations at Gas Industry House to amalgamate, it does seem to me that the Commercial Meetings of the District Association could be brought more into touch with the ramifications of our National Associations.

I have felt in the past that a great deal has been left to a few elected members to carry on the work of the National Bodies, and although this work is being carried on admirably, information has not been forthcoming to individual undertakings as it ought to.

The British Commercial Gas Association are hoping to convene meetings in the Districts bi-monthly, the subject matter of which is of great interest to all members of our Association, and if taken in conjunction with our Commercial meetings would be a benefit to everyone concerned, and would minimize the engineers' travelling time to these meetings.

I am sure that this co-operation would enable even the smallest undertakings to air their views, which should be to the benefit of the Industry, and would reduce to a minimum the present considerable correspondence which individual undertakings must have with Headquarters when seeking information.

For my own part, I would like to see this co-operation taken still further, and that at least once a quarter an official of the National Gas Council would visit the meetings and give a résumé of the work carried out there which to my mind is more vital now to the Industry than at any other time in its history.

## History of the Devonport Gas Undertaking.

The Devonport Gas Undertaking was first formed by a number of local gentlemen in 1844, with a capital of £15,000 subscribed by 204 shareholders, and duly authorized by Parliament in 1853 with statutory limits of supply confined to the Parish of Devonport.

In 1902 the Company was purchased by the Devonport Corporation at a cost of £153,271, when the make of gas was 268,000,000 cu.ft. and the number of consumers 7,962.

In 1914 Plymouth Corporation by amalgamation took over the undertaking when the make was 487,000,000 cu.ft. and 20,153 consumers.

To-day the gas made is 920,000,000 cu.ft. supplying 28,244 consumers. The total capital expenditure on the undertaking is £775,722, and the outstanding debt is £232,388.

The statutory limits of supply are exactly the same as in 1902, and are only 3,356 acres, or 5·24 square miles.

## Carbonizing Plant.

The coal gas carbonizing plant at Devonport consists of 13 beds of 10's with Dempster-Toogood descension pipes and 5 beds of 8's with ascension pipes.

The description of the former was comprehensively given in a Paper I had the pleasure of reading to you in March, 1929, entitled "Modern Horizontals at Devonport."

The retorts were originally built up of 95% silica for 6 beds, moulded siliceous 84% silica for 2 beds, and moulded fireclay in 1 bed. The silica beds and those built in siliceous material alternated down the bench, the primary object being to gain actual and continuous experience of all materials during the summer and winter loads and when resetting became necessary valuable experience would then be available.

Combustion chamber temperatures were carefully watched and kept at steady temperatures of 1,310° C. to 1,330° C. and all external carbonizing conditions were maintained exactly similar for all beds.

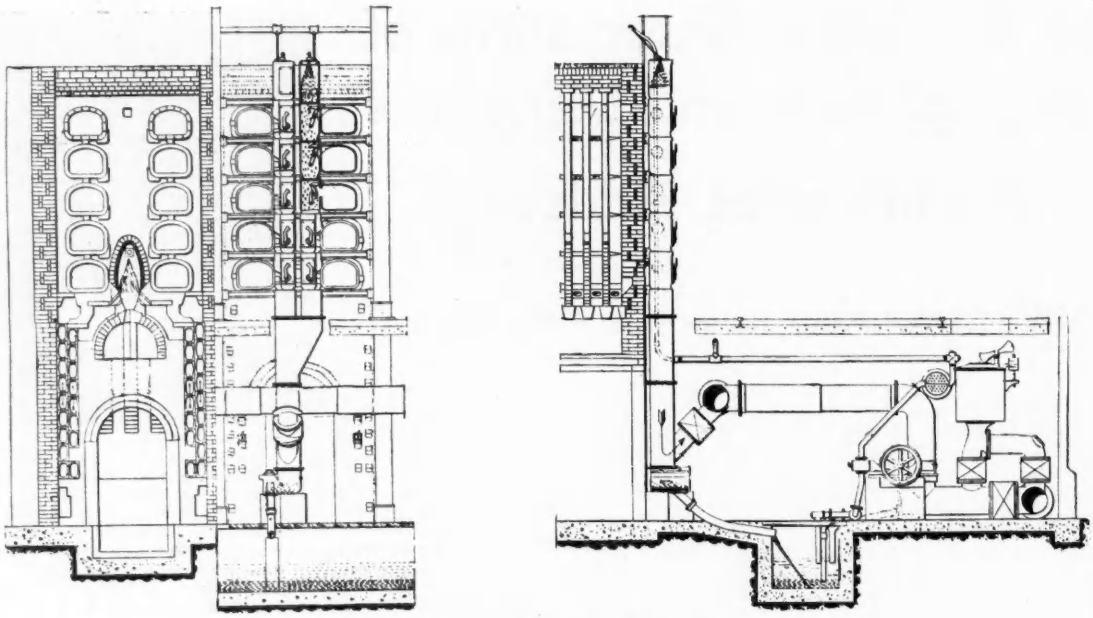
The first bed which became necessary to reset was the one built in moulded fireclay, and this was after a working life of 1,208 days.

Two further beds were reset in April, 1934, and one of these had been built in moulded siliceous material, and its working life was 2,155 days.

The remaining bed of siliceous material was reset in the following year after a working life of 2,397 days.

The last three beds of 95% silica have been reset in August, 1938, after a working life of 3,264—3,445 days.

In the summer of 1936 a further 4 beds of the Dempster-



Dempster-Toogood Horizontals at Devonport.

Toogood descension pipe type were installed and built in 95% silica material. These have since worked continuously.

When the first three beds of silica retorts were reset the segments of the crown of the retort were in excellent condition and would have lasted a considerable period longer. The floor of the retorts had been worn to some extent due mainly to the action of the chain of the retort charging machine. There seems little doubt, therefore, that for large horizontal retorts, segmental 95% silica has proved the best material for conditions similar to those in my Department.

As far as the regenerators are concerned, I would point out that these have not been reset since the beds were first built, and the tubes are still in good condition.

Some slight trouble was originally encountered with the descension pipe system and pitching up of the foul mains occurred to some extent. The whole success of this system is, in my opinion, entirely dependent on sufficient hot liquor circulation and a proper attention to the sprays.

## Benzole Recovery.

In 1932, when I read a Paper before you on Benzole Recovery at Devonport, I stressed the national and local benefits of this process, which was then by no means orthodox practice in medium-sized and small gas-works.

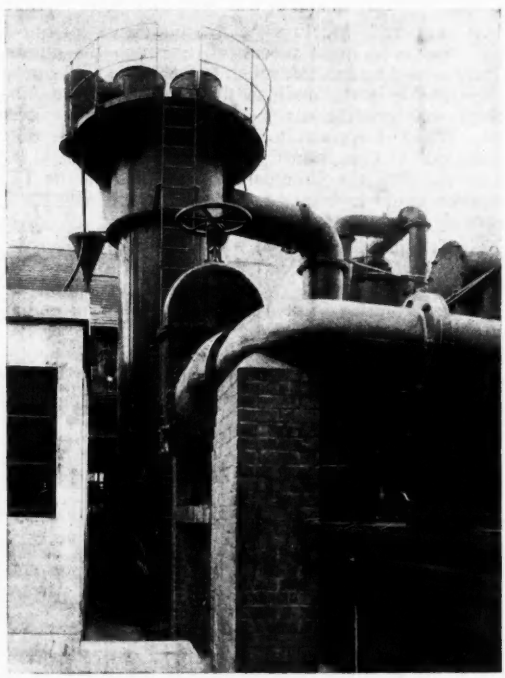
I am as enthusiastic to-day as I was then, and am pleased to think that my undertaking has now produced more than one million gallons of crude benzole.

I know that many gas engineers still have their doubts as to whether or not the production of benzole is profitable. For my own part, and as far as my own undertaking is concerned, I am certain that we should not have been able to maintain our present price of gas had it not been for this ideal and silent consumer.

We have been living in very troubled times, and as all the fighting forces are becoming more and more mechanized, it seems to me that it is essential that every gallon of benzole available should be produced as such in this country.

We talk a lot about the Gas Industry being necessary for the well-being of our country. I am sure, therefore, that it is our duty to produce this now very vital commodity. May I point out that unless one is recovering benzole, this constituent is going forward in the gas, and in the case of a large consumer one is prepared to sell at a considerably reduced rate. I cannot see, therefore, why this constituent cannot be collected in the gas-works in the form of crude benzole, and sold at a figure which in many cases is higher than the highest price per therm charged.

Every undertaking is anxious to obtain fresh outlets for its products, and while gaseous and solid therms were originally our primary interests, I see no reason why liquid therms should not have the same attention, especially so as their distribution costs are negligible.



De-Tarrer.

When the plant was installed in 1932, it was intended that the whole of our product be rectified and sold to the City of Plymouth Transport Department. This arrangement worked well for a few years, but I am glad to say that we are now members of the National Benzole Association and producing crude 85's benzole only.

Owing to the congestion in the works it was necessary to place the benzole washer in the gas stream prior to the purifiers. The action of tar fog caused sludging of the wash oil, which at times was rather excessive.

An electrical tar precipitator was installed some 18 months ago, and this has had an extremely beneficial effect not only on the benzole plant wash oil and the washing plant, but also on the tar content of the spent oxide, which has already been reduced to below 0·5%.

Our total sales for the last financial year were 159,599 gallons of 85's crude benzole, and assuming one gallon of benzole is equivalent to 1½ therms, this represents 239,000 therms, or approximately 53 million cu.ft. of gas of 450 B.Th.U. per cu.ft.

The benzole recovered represents a consumer some 4 million cu.ft. more than the total bulk supply to H.M. Government establishments in Devonport, and would represent a 6% increase in our output.

Had the two consumers been identical in quantity the revenue derived from the benzole consumer would have been some £3,000 more than that from the Government establishments.

In conjunction with the figures set out in my Paper already referred to, need I say more?

## Waste Heat Recovery.

Two Lancashire boilers installed in 1896 were used for generating steam for general purposes on the works.

These boilers reached the end of their useful life, and it was decided to install a waste heat boiler on the horizontal settings.

A Spencer-Bonecourt Horizontal Waste Heat Boiler with a Sirocco fan direct coupled to a Sissons compound engine was installed in December, 1937. The boiler is fitted with the usual Hi-low alarm and automatic water feed devices. When the boiler was first put to work the fan speed was adjusted to give exactly the same draughts as that given by the chimney stacks, and not the slightest trouble with the settings was experienced.

I give below a few particulars of the average performance of the boiler for the last twelve months:

| | |
|---|---|
| Boiler inlet gas temperature .. .. .. | 510° F. |
| Boiler outlet gas temperature .. .. .. | 220° ,, |
| Average % $CO_2$ in waste gases from settings .. | 12 to 14% |
| Lb. steam per lb. producer fuel .. .. .. | 2·52 lb. |
| Average steaming ra e per hour from feed water at 60° F. to steam at 120 lb. per sq.in. .. .. | 4,500 ,, |

The exhaust steam from the fan engine is used to preheat the feed water to a temperature of 140° F., and the town's water used in the boiler is treated with a small amount of soda-ash. When the boiler was down for inspection after six months' work the internal condition of the boiler was found to be very satisfactory.

The actual boiler fuel in the form of coke breeze that has been saved and made available for sale in one year was equal to half the capital cost of the total installation.

There is, therefore, no doubt in my mind that, providing air infiltration is kept to a minimum by careful maintenance of the settings and a market for coke breeze is available, that waste heat recovery in horizontal settings is a very sound proposition.

## Coke.

There was a day when gas coke was looked upon as a liability in an undertaking and was often sold at an uneconomic figure. To-day coke has become an ideal smokeless fuel and the sale of it of vital importance to our Industry. It is essential, however, that coke marketed by gas undertakings should be carefully graded and sold free from dust and excess moisture. I am very pleased that the undertakings in the South-West of England have now joined the London and Counties Coke Association. I am convinced that with the aid of this Association we shall be able not only to receive, but maintain, an economic return for this residual product.

## Air Raid Precautions.

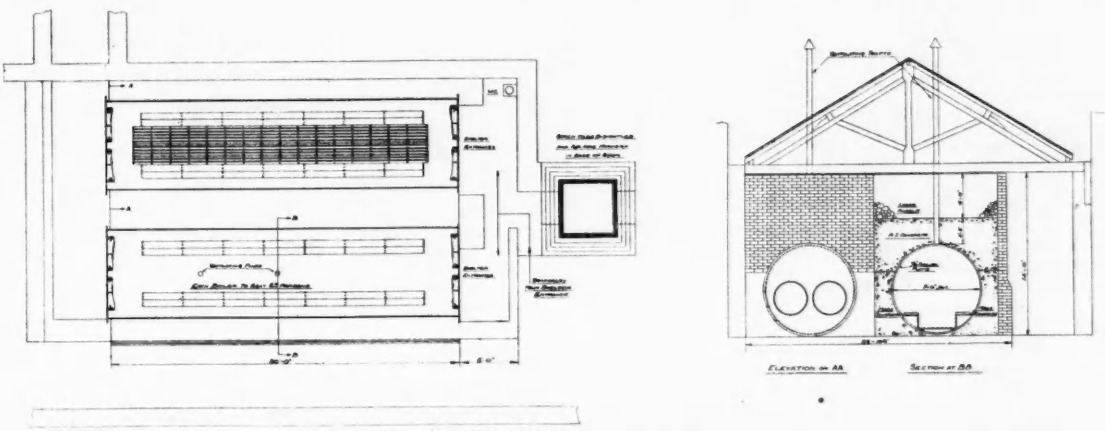
Precautions against an air raid attack have been occupying the minds of gas engineers for some considerable time. Everyone will agree that the Gas Industry was indispensable during the last War, even when aircraft were in their infancy. It is now more than essential that every possible precaution should be taken to enable the supply of gas and the production of its many by-products to be maintained at all times during any future hostilities. How reasonable protection can be afforded is, of course, for each individual undertaking to consider, as there is no doubt as to the vulnerability of every gas-works.

The Government have insisted that gas undertakings should follow the "Good Employers' Code" before any financial assistance would be given them for certain specific items.

My Department will shortly be in the process of erecting new offices and stores, &c., on the existing premises, and provision has been made for sheltering in the basement the whole of the personnel of the works. The men's new messrooms have been so designed that with small structural alterations they can easily be converted into a decontamination centre. In the meantime, a shelter has been constructed out of two old Lancashire steam boilers which have ceased as such to be of use for steam raising. The fire-tubes were cut out, and all flues filled with mass concrete. Retaining walls were built up and the tops of the boilers covered with reinforced concrete. This will afford temporary shelter for some 50 men. A sketch of this shelter is shown.

I think it safe to say that should a town be bombed by aircraft and fires break out, the local fire brigade and the newly-formed Auxiliary Brigades will be far too busy to be of much assistance to undertakings like our own. While all undertakings have emergency fire-fighting apparatus connected to the town water supply, it was thought necessary in the case of my own Department to augment this with further hydrants at strategic points so that shorter lines of hose would be necessary in case of fire.

However, this system may be interfered with by damage



Air Raid Shelter for 50 Persons.

to outside supply mains or by large quantities of water being drawn off for other fire-fighting purposes.

My Works were fortunate to have an underground storage tank which could hold an emergency supply of more than 250,000 gallons.

After consultation with the Chief Fire Officer of Plymouth, the Department purchased a standard Dennis motor trailer pump with a capacity of 500 gallons per minute in order to use this static supply if and when required.

To deal with incendiary bombs a number of hand-pumps and the necessary equipment, together with suits of protective clothing and general service respirators, have been purchased.

I have only mentioned one or two points in this direction, and while I am certain that everyone is doing all they can in Air Raid Precautions, I do hope that our efforts in this direction will never have to be put to the test.

## Price of Gas.

The area supplied by my Department is at least 80% domestic, in which the bulk of the consumers are workers in H.M. Dockyard.

My Department has not adopted any 2-part tariff, but has been content to supply all private consumers at a little over 6½d. per therm, or 2s. 6d. per 1,000 cu.ft. Any consumer claiming to use gas for profit, such as fish friers, restaurants, &c., are charged, irrespective of the quantity used, at the rate of 5¼d. per therm, or 2s. 2d. per 1,000 cu.ft.

H.M. Dockyard consume some 5% of our total output, which is, of course, charged at a lower figure still.

## Sales and Hire Purchase, &c.

It was not until 1931 that my Committee agreed to open a showroom in the Town and establish a system of hire purchase. Before this time all gas cookers were fixed on simple hire at a very nominal figure of 5s. per annum, and capital was being raised at the rate of £10,000 per annum to meet the demand for these cookers. With a floating population such as is found in every dockyard, naval, and military town, the rate at which these cookers were being exchanged was out of all proportion to the revenue derived, and was rapidly becoming a millstone to the Undertaking.

I am firmly convinced that a system of hire purchase is beneficial to an undertaking such as ours. The system has been so successful that it has not been necessary to raise any further capital for the simple hire of appliances since the new hire purchase scheme was introduced.

In 1935 the Electricity Department of the City commenced a scheme of simple hire for electric cookers with a slogan of "Less than a penny a day." My Department replied with a long-term hire purchase scheme and a slogan of "Yours for 6d. a week." We supplemented this scheme with intensive local press advertising, and the figures quoted speak for themselves:

*Cookers.*

| Year. | Sold. | Hire-Purchased. |
|---|---|---|
| 1931–32 | 273 | 354 |
| 1932–33 | 173 | 456 |
| 1933–34 | 182 | 426 |
| 1934–35 | 213 | 564 |
| 1935–36 | 217 | 1,438 |
| 1936–37 | 242 | 3,186 |
| 1937–38 | 205 | 2,862 |
| 1938–39* | 150 | 2,900 |

* = Estimated.

Out of some 28,000 consumers, approximately 14,000 have now bought or hire-purchased an all-enamelled gas cooker.

It is not our practice to charge excessively for these cookers. The charge is, in fact, less than that made for a similar sized electric cooker on simple hire. All instalments received for hire purchase are kept in a separate account and all appliances are fixed and regularly maintained free of charge. The hire purchase account is self-contained and all surpluses are used to maintain the appliances regularly without cost to the consumer. In addition to enamelled cookers, the hire purchase scheme has been applied to fires, water heaters, and wash boilers, and has been equally successful.

I am firmly convinced that to keep any business, a system

CITY OF PLYMOUTH GAS DEPARTMENT.—WEEKLY COSTING SHEET, 1938-39.

[Only the Five Weeks Ended Nov. 2, 1938, shown].

| MANUFACTURE OF GAS. | Bt. Forward from Previous Quarter. | Week Ended Oct. 5. | Total to Date. | Week Ended Oct. 12. | Total to Date. |
|---|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Carbonizing, wages, depositing coal on works— | | | | | |
| Discharging boats | | | | 16 4 1 | |
| Handling into works stores | | 5 4 1 | | 2 10 10 | |
| Sub total | | 5 4 1 | | 18 14 11 | |
| Coal handling into works— | | | | | |
| Handling from reserve stores | | 2 6 6 | | 9 8 2 | |
| Handling into retort house | | 8 3 3 | | 6 14 4 | |
| Sub total | | 10 9 9 | | 16 2 6 | |
| Coal carbonization— | | | | | |
| Stokers and retort house labour | | 118 15 2 | | 116 13 8 | |
| Water gas production— | | | | | |
| "A" set | | 10 4 6 | | 27 7 1 | |
| "B" set | | | | | |
| "C" set | | 13 16 11 | | 6 12 4 | |
| Coke handling to C.W.G. sets | | 0 15 4 | | 1 16 3 | |
| Sub total | | 24 16 9 | | 35 15 8 | |
| Total wages | 4,967 12 11 | 159 5 9 | 5,126 18 8 | 187 6 9 | 5,314 5 5 |
| Estimates quota | 5,150 1 2 | 198 1 7 | 5,348 2 9 | 198 1 7 | 5,546 4 4 |
| Carbonizing, materials— | | | | | |
| Coal | | | | | |
| Depositing coal on works, transport to works | | 9 8 11 | | 11 0 6 | |
| Electricity | | | | | |
| Sub total | | | | 11 0 6 | |
| Coal handling in works— | | | | | |
| Handling from reserve store | | | | 4 18 0 | |
| Cartage from reserve store | | | | | |
| Sub total | | | | 4 18 0 | |
| Coal carbonization— | | | | | |
| Electricity | | | | | |
| Water | | | | | |
| Sub total | | | | | |
| Water gas production— | | | | | |
| "A" set | | | | | |
| "B" set | | | | | |
| "C" set | | | | | |
| Water | | | | | |
| Coke handling to C.W.G. sets | | | | | |
| Cartage | | | | | |
| C.W.G. oil | | | | | |
| Sub total | | | | | |
| Total materials | 32,321 11 5 | 9 8 11 | 32,331 0 4 | 15 18 6 | 32,346 18 10 |
| Estimates quota | £34,787 9 2 | £1,337 19 7 | £36,125 8 9 | £1,337 19 7 | £37,463 8 4 |

| MANUFACTURE OF GAS. | Week Ended Oct. 19. | Total to Date. | Week Ended Oct. 26. | Total to Date. | Week Ended Nov. 2. | Total to Date. |
|---|---|---|---|---|---|---|
| Carbonizing, wages, depositing coal on works— | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Discharging boats | | | 30 18 4 | | | |
| Handling into works stores | 5 3 4 | | 0 19 10 | | 3 18 8 | |
| Sub total | 5 3 4 | | 31 18 2 | | 3 18 8 | |
| Coal handling into works— | | | | | | |
| Handling from reserve stores | 11 6 4 | | 2 11 3 | | 0 2 7 | |
| Handling into retort house | 7 6 4 | | 8 0 2 | | 7 0 6 | |
| Sub total | 18 12 8 | | 19 11 5 | | 7 3 1 | |
| Coal carbonization— | | | | | | |
| Stokers and retort house labour | 116 13 9 | | 116 15 7 | | 117 8 2 | |
| Water gas production— | | | | | | |
| "A" set | 34 2 1 | | 16 17 7 | | 19 8 5 | |
| "B" set | | | 26 8 5 | | 25 9 9 | |
| "C" set | 3 8 10 | | 3 8 10 | | 7 10 6 | |
| Coke handling to C.W.G. sets | 3 16 0 | | 3 13 11 | | 3 8 0 | |
| Sub total | 41 6 11 | | 50 8 9 | | 55 16 8 | |
| Total wages | 181 16 8 | 5,496 2 1 | 209 13 11 | 5,705 16 0 | 184 6 7 | 5,890 2 7 |
| Estimates quota | 198 1 7 | 5,744 5 11 | 198 1 7 | 5,942 7 6 | 198 1 7 | 6,140 9 1 |
| Carbonizing, materials— | | | | | | |
| Coal | | | | | 5,456 1 6 | |
| Depositing coal on works, transport to works | 8 1 0 | | 21 15 3 | | 9 0 3 | |
| Electricity | | | | | 5 0 0 | |
| Sub total | 8 1 0 | | 21 15 3 | | 14 0 3 | |
| Coal handling in works— | | | | | | |
| Handling from reserve store | | | | | | |
| Cartage from reserve store | 9 11 8 | | 1 14 2 | | | |
| Sub total | 9 11 8 | | 1 14 2 | | | |
| Coal carbonization— | | | | | | |
| Electricity | | | | | 25 0 0 | |
| Water | | | | | 109 11 10 | |
| Sub total | | | | | 134 11 10 | |
| Water gas production— | | | | | | |
| "A" set | | | | | | |
| "B" set | | | | | | |
| "C" set | | | | | 390 12 0 | |
| Water | | | | | 18 19 2 | |
| Coke handling to C.W.G. sets | | | | | | |
| Cartage | | | | | | |
| C.W.G. oil | | | | | | |
| Sub total | | | | | 409 11 2 | |
| Total materials | 17 12 8 | 32,364 11 6 | 23 9 5 | 32,388 0 11 | 6,014 4 9 | 38,402 5 8 |
| Estimates quota | £1,337 19 7 | £38,801 7 11 | £1,337 19 7 | £40,139 7 6 | £1,337 19 7 | £41,477 7 1 |

of free and regular maintenance is essential. Nothing can be more annoying to consumers and detrimental to an undertaking than to receive petty accounts for the adjustment of appliances, which in many cases are caused by some fault over which the consumer has no control.

## Costing.

It is my considered opinion that unless an undertaking has an accurate costing system it is impossible for that undertaking to work efficiently. In common with all Departments of the City of Plymouth Corporation, my Department in February of each year presents to the Council an estimate of the revenue and expenditure for the next current year commencing April 1.

The Plymouth Corporation Act of 1915 precludes the Department from making any excess profit, and any such profit must be utilized to the reduction of the price of gas supplied in the Department's area. The reason for this is that, as my area of supply is only part of the City of Plymouth, no portion of our income can be allocated to the relief of rates.

A short description of the costing system that has been developed in my undertaking may be of some interest.

Every item of expenditure is covered by a code allocation number and taking one item for an example, we have:

| Code Allocation No. | Item: Manufacture of Gas. |
|---|---|
| 1 | Coal. |
| 2 | Labour discharging each coal boat. |
| 3 | Cost of transport to works. |
| 4 | Cost of handling into works store. |
| 5 | Cost of electricity used in handling. |

The whole of the gas works production is similarly allocated together with maintenance of works, residuals, transport, &c.

The distribution, management, and capital expenditure of the undertaking are treated in a like manner.

All materials and labour are allocated separately under their respective code numbers. Every man in the Department sends in a time-sheet daily, and his work is coded by his respective foreman. Orders on stores issued daily are similarly treated.

A return each week is placed before me showing the analyzed and total expenditure in detail and under all their respective code numbers.

It is, therefore, possible for me to keep in close touch with every phase of the Department's financial activities. The estimated figures are given in separate colour against the main sub-totals.

An example of this system of costing under the sub-heading of manufacture of Gas-Carbonizing, for the five weeks ended Nov. 2, 1938, is given.

It may be said that it is difficult to estimate revenue and expenditure for a full year with a turnover of some £200,000. It is, however, arrived at in the following manner, and with the aid of three previous years' balance-sheets.

The interest and sinking fund of the Department, which is equivalent to the dividends in the case of a private company, is a known charge each year and can be accurately forecast.

A definite programme of extraordinary maintenance and repairs on the works and on the distribution side of the undertaking is drawn up.

As the cost of the coal is known, the cost of carbonization can be accurately arrived at, having assumed an approximate increase in sales of gas. The revenue to be derived from residuals can then be foreshadowed.

It may be said that the fallacy of this system is that the revenue from gas cannot accurately be foretold. However, with such a system as this it is possible to meet any decrease in revenue that might occur from this or any other source.

From my own experience over the last twelve years, I have found this system to be most helpful.

It is inevitable that a Presidential Address should deal largely with one's own experiences, a few of which I have tried somewhat inadequately to place before you.

The Gas Industry has a very proud record of achievements. It can safely be said that in the utilization of coal in a well-managed gas-works, there is absolutely no waste. This can hardly be asserted in any other industry in existence.

It is my belief that we are more firmly entrenched than ever before, and provided we maintain our present standard of efficiency and continue to explore every avenue of possible expansion, the future of the Gas Industry is well assured.

# Manchester District Association of Gas Engineers

# Presidential Address

OF

**H. SINGLETON, M.I.Mech.E.,**

Engineer and Manager, Huddersfield Corporation Gas Department.

Delivered at the Annual Meeting of the Association held in Manchester on March 24.

THE PRESIDENT.

Mr. H. Singleton entered the service of the Longwood Gas Company, becoming articled to Mr. J. H. Brearley, M.Inst.C.E., the Engineer, Manager, and Secretary. In 1910 he became an Assistant Chemist at the Neepsend Works of the Sheffield Gas Light Company. In 1912 he was appointed Chief Technical Assistant at the Huddersfield Corporation Gas Department. In 1915 (at the age of 25 years) he was appointed Engineer and General Manager of the Huddersfield Works, which post he still holds. In 1919 the Longwood and Slaithwaite Gas Company (where he served his articles) was purchased. He is a member of the Institution of Mechanical Engineers, holds 1st class honours City and Guilds certificates in Gas Engineering and Gas Supply.

As your new President of this Association, I wish first of all to thank you very simply, though none the less sincerely, for the honour you have conferred upon me in electing me to this office, and I shall spare no effort to further the objects of this Association.

I have been a member of this Association for twenty-two years, during which time an almost infinite variety of subjects has been described and discussed in the various Papers and Addresses which have been presented, and it therefore becomes successively more difficult to find new themes on which to address the members.

The working day of the gas engineer and manager during the last few years seems to be more and more taken up with matters which twenty years ago were taken much less seriously. New business to-day has to be sought intensively, and what to my mind is more important is to retain what we hold. A constant supervision of market conditions and values for the purchase of materials required for manufacture, distribution, and maintenance, and for the sale of gas and by-products is imperative owing to the rapid movement and almost daily altering conditions in commerce. Organization and administration of the various activities of a gas undertaking seem to be gradually crowding out what was once considered the most important side—namely, the engineering and chemical section, which to my mind is the most absorbing work of the gas engineer and manager.

In the presentation of an Address I have always felt that if possible something original should be given, but with such a wide field of research which is now undertaken by The Institution of Gas Engineers, the Gas Light and Coke Company, the Society of British Gas Industries, the South Metropolitan Gas Company, and others, the "Jack of all Trades" engineer and manager cannot hope to compete. One must, however, acknowledge the great debt we owe to these bodies for the very valuable work they are doing for the Industry generally.

## Early Plant at Huddersfield.

When I was appointed to my present position in 1915 the carbonizing plant consisted of two retort houses, in one of which was installed two benches of inclined retorts of ten beds in each bench, and one bench of 8 beds of horizontal retorts. The other retort house contained two benches of inclined retorts of 12 beds per bench, and this house was left without one gable with the idea of extending it to accommodate other benches of inclined retorts in the future. The horizontal retorts had not been worked for 18 years, and were, of course, not provided with any mechanical means for coal or coke handling or for charging or discharging. The whole of the inclined retorts were set in beds of nines and were only 15 ft. long and 15 in. by 22 in. section. The useful carbonizing plant was therefore 44 beds of nines, all inclined retorts. In 1915 the old horizontal retort bench was dismantled and on its site a complete installation of modern horizontal retorts 23 ft. long by 18 in. by 24 in. section in one bench of nine beds was erected. The new bench was equipped with Drake's charging and discharging machine, motor-driven furnace feeding chute, tray type hot coke conveyor with automatic quenching, which discharged into a gravity bucket conveyor carrying the coke to the breakers and screens, and the coke storage hopper as shown in fig. 1.

This coke handling system was worked for two years—a period during which great difficulty was experienced in obtaining renewals and during which time it was found to be very expensive in repair and subject to not infrequent breakdowns. Other methods of coke handling were considered, but we were confronted with the following awkward conditions.

The retort house was too low to operate an ordinary telpher machine; the width of the retort house is 90 ft., and the bench being situated centrally and the operating floor being at yard level rendered it unsuitable for adoption of any of the generally successful methods of coke handling. It was, however, ultimately decided to use a skip travelling in the trough in which the tray conveyor worked, and propelled by means of a motor-driven endless rope. The skip had a bottom discharge door which was opened and closed by an attendant stationed at the central discharge position. An inclined skip was installed so that it received this discharged coke, which it elevated and distributed on to a coke quenching bench. One attendant operated both the horizontal hot coke skip and the inclined coke skip. The coke after quenching was released by the quenching attendant into the shortened gravity bucket conveyor as shown in fig. 2. This system worked very well and was very low in maintenance costs, but it had two great drawbacks. One was the large quantity of breeze which it produced by reason of the coke having to withstand five separate drops, and the other was that quenching was never even. Fig. 1 shows the first arrangement of the coke handling, and fig. 2 shows the skips and quenching bench arrangement.

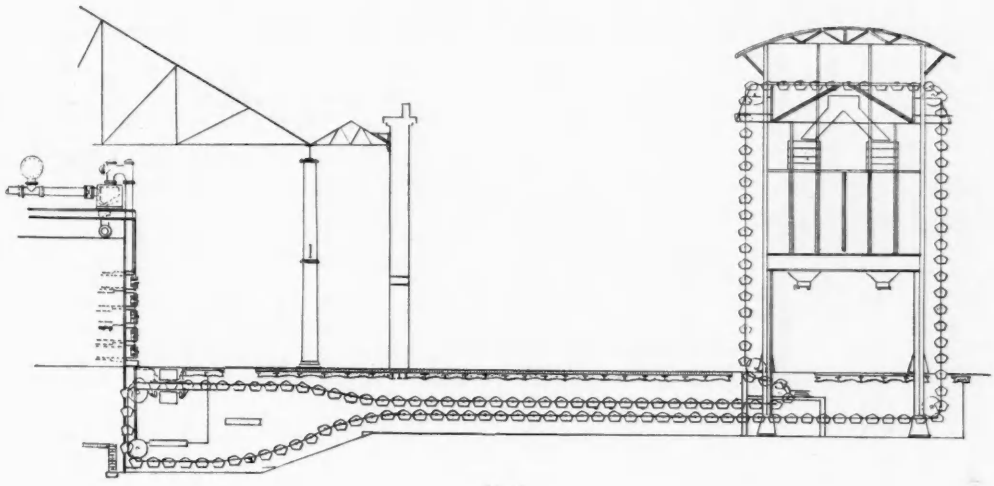


Fig. 1.

## A Special Telpher.

In order to reduce breeze production and improve the quenching of the coke, a further alteration of the handling system was undertaken. A special telpher was designed to travel on a double track, this being necessary so that the cab could be placed behind the coke skip away from the retorts. This arrangement of the telpher had two advantages. The driver was enabled without any assistance to place the skip accurately to the mouth of any retort, and whichever direction the skip travelled the cab did not receive the smoke and heat from the coke, as the two travelled in parallel. The skip besides being travelled up and down the retort house can move 2 ft. up to or away from the mouthpiece. The travelling mechanism is electrically locked to prevent movement when the skip is moved up to the retorts.

The skip takes the coke at any mouthpiece height without landing, thereby causing a minimum breakage, besides saving time in lowering and hoisting. Spring guide buffers steady the skip quickly after hoisting for travelling. The unquenched coke is automatically discharged into a centrally placed hopper; the discharging mechanism is operated by a partial landing of the skip over the hopper, whereby the bottom doors open by lowering and close again on hoisting. Coke is continuously withdrawn from this hopper by means of a drag-bar conveyor passing through water sprays. This arrangement is shown in fig. 3 and details of the special telpher in fig. 4.

In the first year in which the latter arrangement was put into operation a saving of over 5,000 tons of coke breeze was effected. The large coke regularly shows on test a moisture content of 2%, but there is over-quenching of the smaller sizes of coke in the bottom of the inclined conveyor by coming into contact with the rejected water.

In 1920 a further bench of 9 beds of Drakes horizontal retorts was installed, and the one telpher handles coke from both benches to the central discharge hopper. It will be noted in figs. 2 and 3 that the railway track bringing coal for this retort house is close to the retort house wall, and this fact limited the angle at which the drag-bar conveyor could be operated and thus made it imperative to work from a hopper in the retort house well lifted above floor level.

In 1923 an Act was obtained by which the Gas Department was empowered to bring railway wagons down a street 370 yd. long and across two main roads (Bradford Road and Leeds Road) to supply the works direct from the railway, and also to supply the Electricity Department with coal. Previous to this date all coal to the gas and electricity works was brought in by horses and carts or canal barges. The coal trucks at the gas-works are shunted to and from the three coal receiving hoppers by a travelling crane which, by means of hinged cradles, also tips the coal wagons. A further horizontal bench of 9 arches was erected in 1926 in the other retort house as a complete unit with coal and coke handling plant and coke storage hoppers. In this latter bench the retorts were constructed of 96% silica segmental retorts 23 ft. long. These beds have given a most satisfactory life of 11 years' continuous working.

Since 1920 the quality of gas supplied from the Leeds Road

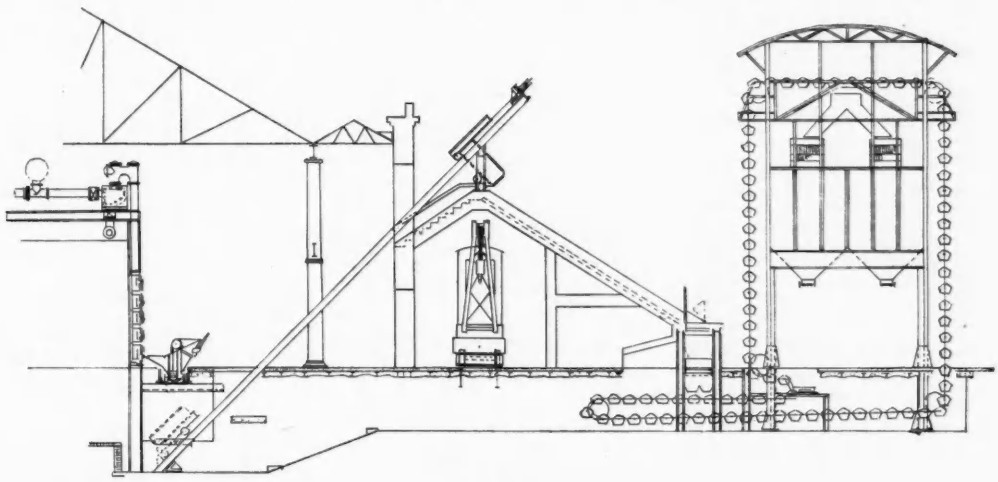


Fig. 2.

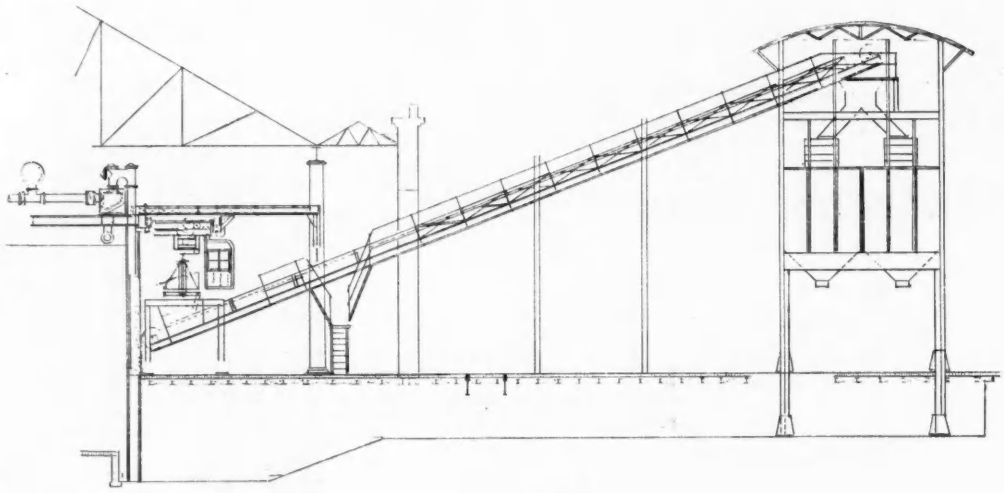


Fig. 3.

Works has been regulated by the addition of a good quality producer gas. The carbonizing plant at this works is entirely horizontal retorts. This producer gas is made in a separate outside generator provided with a dust trap water seal and separate water scrubber before being mixed with the coal gas. The fuel used in the producer is coke recovered from the furnace ashes of the carbonizing plant.

## Coke.

The co-operation of oven coke producers is a welcome move which should be very useful in price stability and the avoidance of the alternating boom and depression prices which unsettle and annoy consumers. As coal must now be purchased on a rigid and uncommercial basis it is necessary that the return from the sale of coke should be equally steady. The organized sale of coke will benefit both producer and consumer. Very little real service has in the past been required by or given to coke consumers, but with the successful adaptation of the various competitive fuels, every process in which coke can be used will demand that attention and service without which business will be irretrievably lost. There are many undertakings now whose gas tariff is such that they themselves are changing over their coke business to gas sales. This point opens up the controversy as to whether we are gas salesmen or coke salesmen; it is very evident that unless we are to adopt total gasification we must be both gas and coke producers and therefore sellers. Again referring to the co-operation of the two hitherto competing coke-producing bodies, it is to be hoped that these, as yet, local agreements may be so consolidated in the various districts that at a very early date a National body may be formed to give general guidance for the co-operation of one district with another, so that ultimately coke may not only be marketed better but may be appreciated by users as a reliable and efficient fuel. Such an organization could by efficient marketing, storage control, and price fixation eliminate a good deal of the necessity which arises in some districts of having to export surplus coke. During the past winter when the demand for coke of all classes has been below normal co-operation has been successful in preventing that disastrous fall in price which has been the experience with similar conditions in the past.

*(To be concluded.)*

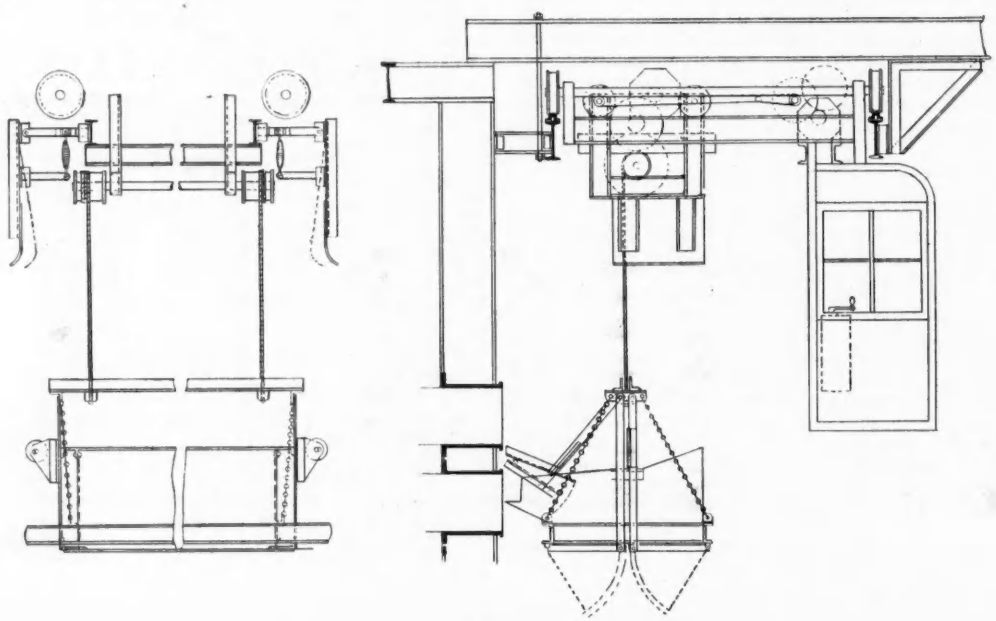


Fig. 4.

# Alleged Maladministration at Southport

**The hearing was resumed on March 20 at the Southport Police Court, of summonses against Mr. J. H. Clegg, the Southport Corporation Gas Engineer, and Mr. W. E. Plevin, the Deputy Engineer, alleging conspiracy at the gas-works in illegal practices in the administration of the Gas Undertaking. Reports of the hearing on Feb. 22, March 3, and March 10 were published in the "JOURNAL" for March 1, 15, and 22.**

When the hearing was resumed on March 21 evidence was given by Mr. E. H. Grainger, one of the chemists with whom it is alleged defendants conspired to produce a low quality gas. In reply to Mr. Blackledge (Counsel for Clegg) Grainger said that at no time did he directly ask Clegg for change of purifying boxes. Plevin was the person in charge; it was to him that he (witness) looked for instructions in that regard. As conditions were, the admission of extra air to the boxes was due to the inability of the boxes to deal with $H_2S$. The low calorific value was undoubtedly due to the admission of extra air. Witness agreed that the practice of admitting excess air was being kept from Clegg, but he did not agree that Clegg knew nothing about the $H_2S$ merely because he did not see the purifier book. He had no knowledge of Clegg asking for, or seeing, the purifier book from the time Plevin came to the works until Dec. 30, 1937. If Clegg was in fact deceived by the absence of entries of $H_2S$ passing to the town between August, 1937, and the end of that year, he was having kept from him one of the factors which might have led him to adduce the possibility of low calorific value.

Mr. Blackledge: Am I right in thinking that you never received any orders from Mr. Clegg to keep calorific value down?—That is so.

Witness added that Clegg was responsible in December, 1937, for the issuing of orders to keep up calorific value. In January, 1938, Clegg urged them to keep up the calorific value. Clegg never refused leave to change the purifier boxes in the sense that he was never asked by witness to do so. As far as he knew, none of the other chemists asked him either. Until the chemists went to the Town Clerk on Jan. 19, 1938, Clegg had not been told by witness of the special holder or the alteration of instruments. Nor had he been told by any of the other chemists, as far as witness knew.

Grainger said that on Jan. 6, 1938, he and Howard (another chemist) went to see Clegg. The reason he went was because he was dissatisfied with the "battle" with Plevin over the air-slide. They considered that Plevin was responsible for the purification and the low calorific value for which they were being blamed. Clegg promised to look into the matter, and although the chemists were not satisfied, they were hopeful. With the exception of the dispute between Plevin and the chemists over the changing of boxes, matters of calorific value had been dealt with in an honourable manner as from Dec. 14.

You knew when you went on the 6th that there had been a meeting of the Committee at which Mr. Clegg had put in recommendations for rises of salary for Plevin and Illingworth?—That is so.

Mr. Clegg did not say that he could not recommend witness for a rise also, Grainger continued, neither did Clegg complain because they had not sent records to him or because the purifier book had not been sent, or that they had not carried out all the tests that were wanted. The chemists were the first to mention the purifying book, and when they did so they told Clegg the other three books had been sent to Eastbank Street, but not the purifying book. Witness definitely knew that book had not been sent, although it had been given to him for that purpose.

Mr. Blackledge: It appears that Plevin was holding it back from Mr. Clegg, doesn't it?

Witness: It did appear so.

## Clegg Not Told.

Even after this interview on Jan. 6 Clegg had not been told of the calorimeter deceptions and the use of the special holder. As far as he was aware Clegg never knew until the private enquiry on Feb. 3, 1938, that the calorimeter had been faked. They did not want to let down the Deputy unnecessarily in bringing up things that were done with. These irregularities had been put right before that date.

When they went to the Town Clerk on Jan. 9 they mentioned the deceptions, although they were then discontinued. That was the first time they had been mentioned by him to any Corporation officials outside Crowlands. Between Jan. 6 and 19, the reason of going to the Town Clerk instead of going again to Clegg was because they had to press Plevin for the last purifier box to be changed, although as far back as Dec. 30 they had mentioned to Clegg the question of air being admitted instead of changing the boxes. This was not mentioned again on Jan. 6. They did not know at what future date the conditions would cease.

## Another Chemist Gives Evidence.

Mr. L. C. Marchant chemist at Crowlands since August, 1929, said it was part of his duties to look after the manufacture of gas and test calorific value. He was aware that the standard of gas the Corporation were bound by law to supply was 470 B.Th.U. and free from sulphuretted hydrogen. The calorific value as supplied to the town between October, 1936, and January, 1938, was below the required standard, although the prescribed tests were being made by the Gas Examiner. The Gas Examiner was not aware that they had a special holder of gas prepared for him. The use of the special holder ceased after Dec. 14, 1937. It had been in use before October, 1936. He (witness) had discussed the question of calorific value with Plevin on many occasions but not with Clegg.

In the middle or towards the end of July, 1937, the new Boys calorimeter was installed in the testing room, to be used by the Gas Examiner and the staff. He had tested the calorimeter with the prover, and the pointer appeared to be low. The effect was to make the calorimeter give a higher reading when adjusted to the pointer level, than when checked with the prover, approximately 5 B.Th.U. difference. When he discussed it with Plevin, he gave him instructions in the first instance to work to the pointer level, which gave the works a slight advantage of B.Th.U. He was instructed by Plevin to reduce the water level in the Hyde meter to give an increase of approximately 10 to 12 B.Th.U. over the value given by the meter when correctly set. He made that alteration and from time to time he correctly re-set the meter in order to find out what was the true calorific value.

Witness went on to describe the dismantling of the $H_2S$ testing apparatus prior to the visit of the Gas Examiner on Jan. 11.

Marchant said that on Dec. 30 Clegg asked what the trouble was with regard to purification, and Grainger said that was a question they had been waiting to be asked a long time. Grainger then told Clegg about what they considered to be insufficient change of the purifiers. They said they had had so many instructions from Plevin to increase the admission of air that it was difficult to maintain the calorific value.

Upon the resumption of the hearing, Mr. Crichton (for Plevin) began his cross-examination for Marchant.

Marchant was asked: "As far as the special holder was concerned, I think you will agree that Mr. Plevin was very reluctant to use the special holder when he first came (to Crowlands)?"

Marchant: Yes, he was reluctant in the first instance.

Mr. Crichton: I think you will agree, his reason for conniving at its use was that he was compelled to conform to the system that had been in use for a number of years?—Yes, that is so.

Mr. Crichton: I want to ask you about something which is quite novel in this case, which, I think, will be a relief to all of us. As a general question, would you say that, from your certain knowledge, the Gas Examiner and his assistant were conniving at the use of the special holder?—No, I should not say that.

It is true, isn't it, that you always knew when the Gas Examiner was coming to the works?—Yes, almost invariably.

You had the calorimeter running by the time he came?—Yes, on odd occasions.

## Counsel and Examiner's Tests.

Mr. Crichton: Were the Gas Examiner's tests inefficiently conducted?—I cannot agree to that.

Mr. Crichton: Did you ever have a conversation with Mr. Plevin in which you told him that on one occasion, to your knowledge, the Examiner did not make a test but copied out a test made in a book?—I cannot recall it.

Are all these things quite so vague in your mind as you make out? Surely it must be clear to you whether you had the conversation I have suggested or not?—I cannot recall any occasion when I told Mr. Plevin that the Gas Examiner had copied a back test.

Ever since the Enquiry was held into the conduct of this matter last year, has it not been found difficult to get the Gas Examiner to make reliable tests?—I cannot agree to the word reliable, but there have been large discrepancies on occasions between the Examiner's tests and the tests made by the staff. The Examiner's tests were spot tests only, and those of the staff were going on all day.

Marchant alleged that there were occasions when the Gas Examiner's tests were not reliable because, he alleged, the Examiner

was in a hurry. He did not always stay at the works for the prescribed length of time to make his test. He (witness) agreed that on occasions the Examiner did not stay long enough to make a proper and reliable test.

Marchant was then referred by Mr. Crichton to the purification record book, and he quoted various entries regarding the purification boxes. He agreed that all three large boxes were changed during the period August to December, 1937, and that three out of four small boxes were refilled during that time.

Mr. Crichton: Does that not demonstrate that provision was being made for the winter load?—Yes.

Marchant said that some of the boxes were taken off at the urgent request of the chemists, and their request was granted.

Mr. Crichton: There was continual trouble between Mr. Plevin and the chemists with regard to this question of the purifiers?—Yes, I agree that Mr. Plevin required many times what we (the chemists) considered to be excessive air admission to the purifiers.

Marchant, proceeding, said that subsequent to a note to the shift chemists on Dec. 14, 1937, they had the utmost difficulty in complying with Plevin's requirements regarding air admission, and at the same time maintaining the calorific value. In order to keep up calorific value they had to restrain some of the excessive air. There had been occasions when they had been compelled to shut off the air for a short time.

Mr. Blackledge (for Clegg) opened his cross-examination and referred to a statement in Marchant's evidence-in-chief when he said there had been no complaints prior to Dec. 23. There was, witness had said, in reply to Mr. Blackledge, a complaint in the note of Dec. 14, on behalf of Clegg, regarding calorific value.

On Dec. 23, witness and Howard were face to face with Clegg and could have spoken to him about calorific value had they wished, Marchant continued. But, in fact, the explanation given of the low calorific value was that it was due to a series of mechanical breakdowns. That was quite true.

Mr. Blackledge: You made some of the entries regarding the special holder for the Gas Examiner before Mr. Clegg's period of employment commenced in September, 1934?

Witness: Yes.

You were well aware the holder was to deceive the Gas Examiner?—Yes.

# Fires and Fuel of the Future - -

By

R. H. BONE, of Cardiff

**From a Paper to the Wales and Monmouthshire Junior Gas Association, Feb. 18, 1939**

As members of the Gas Industry, two words—Smoke Abatement—must always occupy an important place in our minds, and our deliberations in regard to policy and developments of the future.

Two things have impressed me greatly during recent months—first, the policy of the B.C.G.A. in linking together gas and coke in their recent campaign, and, secondly, the consideration which has been given by members of the Industry to the various questions relative to the production and marketing of coke, and the prominence given to these problems by the Technical Press in the form of contributed articles and editorial comment. Would we not at once agree that the focusing of our attention on this important matter is both timely and helpful?

Coke must be an important factor in the economic structure of the Industry. I think it is generally agreed that unless the methods at present employed in the production of gas are considerably changed, thereby reducing costs, we must look to increased income from sales of residuals to bring about any reduction in the selling price of gas which is so essential to our efforts in creating a larger demand for our commodity. Every day brings with it even keener competition, and this question of price is vital.

How, then, are we to derive maximum benefit from our coke? Do we realize that at present we are not only concerned in finding new and profitable sources for our output, but in maintaining our existing markets? What is to be faced in the manner of competition? How do we intend to meet it? What is the position in regard to suitable appliances necessary for the efficient consumption of coke—appliances which can be relied upon to give satisfactory service to the consumer? These are questions which I submit must be given attention and answered with as little delay as possible.

I realize that in dealing with the question of coke, particularly in this area, there are circumstances existing which may differ from those prevailing in other regions, and that different districts may have their own peculiar problems. On the other hand, there are problems which are common to all.

## Creating a Better Market.

Many developments have taken place recently to create a better market for coke, and there is no doubt that with an approved scheme of marketing, together with grading and constant quality, it is now possible to place our principal residual in a more remunerative market. I am of the opinion that smoke abatement will, sooner or later, become an accomplished fact, and because of this there will be an increasing market for graded gas coke. I would further submit that we must make a careful survey of our markets, and not lose sight of the fact that, whatever has been done, we have not yet touched the fringe of a large potential demand. This is brought home to us more forcibly when we realize that in this country some 40 million tons of raw coal are used for domestic heating purposes each year.

The problem of marketing in districts where there is no association is one for the attention of the individual undertaking. Various undertakings have their own methods of marketing. Some employ direct sales methods—that is, deal solely with demands of their own consumers. Others carry out their sales campaign in co-operation, either wholly or in part, with the local merchant.

There cannot be complete success without a comprehensive marketing scheme dealing as it would, not only with the question of price maintenance with other interests, but with every phase and ramification of marketing, particularly publicity, personnel (technical and sales), and co-operation with such bodies as heating engineers. We do know that the question of marketing has been dealt with most successfully by associations set up within our own Industry, and that the experience of such must be of untold value.

There are two large classes of consumers which in my opinion provide markets for considerable quantities of graded coke. These are the domestic consumer, interested in space and water heating, and the consumer, whether industrial or domestic, depending upon central heating. In regard to the domestic consumer, I think there is a preference, in the minds of the British public for space heating by a solid fuel fire, and I personally feel convinced that whatever direction our efforts may take in regard to this particular problem, there will always be the demand for at least one open fire in the home.

Much has been said in regard to the sale of open coke fires being detrimental to the sale of gas fires and incidentally gas, but it is interesting to note that the result of a census, undertaken by the London and Counties Coke Association, indicated that the percentage of gas fires displaced by open coke fires was much less than 10%, and in any event some gas fires would have been removed.

Further, must we not take note of one very important fact? I refer to the purchasing power of the public. It is estimated that approximately 80% of families' incomes in this country are less than £5 per week; a large percentage fall below £3 per week. People with incomes below £3 a week cannot afford to buy space heating in the form of gas at 9d. per therm. Have we not got the answer to this question in being able to offer suitable coke at reasonable prices?

## Efficient Appliances Available.

In regard to appliances available, a considerable amount of research has been done by the manufacturers and the Gas Light and Coke Company, and it can now be said that appliances of the right construction and high efficiency are available and can be offered to the public with all confidence. There is no doubt that these fires can be readily sold—they are attractive in themselves—they are labour saving, clean, convenient. and, above all, provide a measure of comfort unobtainable from any other kind of fire. More than 200,000 gas-ignited domestic open coke fires have been installed in

the London and Home Counties Area in little over four years.

In regard to central heating, one of our main sources of competition is the mechanical or under-feed coal stoker. This type of appliance has proved a real competitor, for the mechanical stoker provides an outlet for low-priced coal. Again, certain types of stoker can be fitted to existing hand-fired boilers, thus minimizing capital outlay. In a very short time the mechanical stoker became very popular and exceedingly large numbers have been installed throughout the country, displacing in the majority of cases the ordinary hand-fired type of boiler which previously consumed gas coke.

This competition can now be met with the gravity feed type of boiler which is suitable for graded gas coke in sizes varying from breeze to broken (2½ in.-3 in.). This type of boiler possesses an advantage over the mechanical stoker in that no mechanism is employed. Another important feature is that the gravity feed boiler can be thermostatically controlled. It is labour saving, since it requires attention only for the purpose of cleaning the fire and re-fuelling only twice in twenty-four hours (the magazines of certain makes will hold twenty-four hours' supply). Another important point is that the efficiency of the appliance is much higher than the ordinary hand-fired type of boiler. Considerable numbers have already been installed, but only a few in comparison with the automatic stoker.

I have confined my remarks to two avenues of a larger and more productive market to which we may direct our energies; there are, of course, additional outlets which deserve our attention—orchard heating, grass drying, soil warming, &c.

If we are to enter the markets referred to, the coke salesman must have full knowledge of the fuel he sells, and more than a little knowledge of the appliances which he recommends. Further, if we desire the co-operation of such bodies as heating engineers, we ought to place ourselves in the position of being able to offer them advice, particularly on appliances.

As an Industry we cannot contemplate a recession in revenue from coke.

## Discussion.

**Mr. H. Maycock** (Abertillery) agreed that the demand for graded coke was increasing. He found cutting the coke gave greater satisfaction to consumers from the point of view of ease of ignition and low ash content.

**Mr. R. T. Mills** (Cardiff) referred to the success obtained in Cardiff in selling coke fires. It had been stated that coke fires were injurious to copper boilers, but from his own experience he could definitely say such was not the case.

**Mr. C. Church** (Newport) dealt with the policy of bringing down the price of gas to such a figure as would compete with solid fuel. What, in Mr. Bone's opinion, was the price at which gas could be sold to compete with coke?

**Mr. E. E. Moore** (Swansea) instanced particulars of certain difficulties he had experienced, with the result that gas fires had replaced coke.

**Mr. F. Robertson** (Cardiff) pointed out that gas consumption might be lost by the policy of pushing coke-fired central heating installations in modern buildings. Very often these new buildings were occupied by former users of gas fires.

**Mr. W. R. Branson** (Cardiff) thought smoke abatement was not such a strong point in South Wales as in other parts of the country. Cardiff, for instance, was already practically smokeless, or, at any rate, far cleaner than, say, London. He thought, too, that discrimination should be exercised in fixing coke grates which might be found too hot for small confined rooms. What steps were being taken to ensure that the installations burned gas coke?

**Mr. W. T. Viney** (Cardiff) and **Mr. C. B. Jones** raised questions on the maintenance of firebars.

**Mr. H. V. Williams** (Cardiff) spoke as a user of a coke grate which had given complete satisfaction.

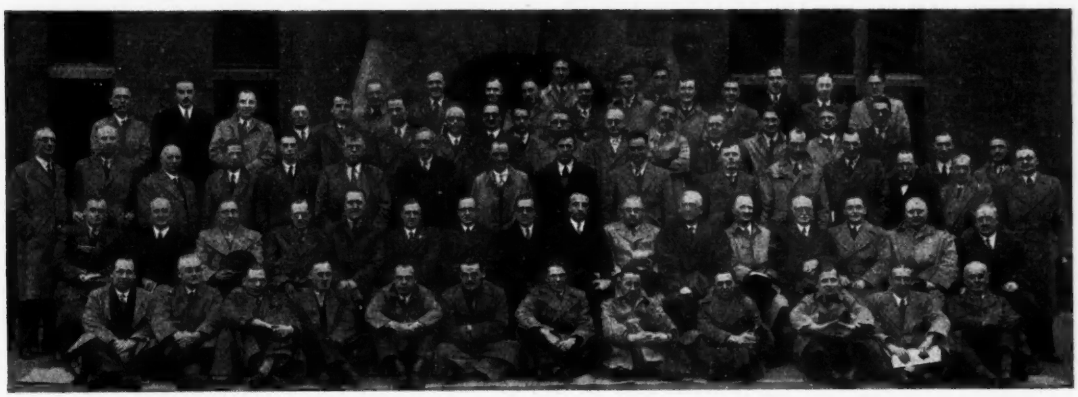
**Mr. C. E. Banham** (Cardiff) remarked that a coke fire very often carried gas into houses where gas had not hitherto been used.

**Mr. A. E. Pask** (Monmouth) proposed a vote of thanks to Mr. Bone for his Paper. To secure a better quality of coke a better quality coal might be necessary, leading to increased manufacturing costs unless coke prices were also advanced.

**Mr. D. W. Rees**, seconding, suggested the sale of coke for industrial work. He did not think anthracite was a serious competitor of coke.

**Mr. Bone** said he was very grateful for the kind way in which his Paper had been received. Replying to the discussion, he said Cardiff coke was machine cut. At the instigation of the Copper Trades Federation, the Birmingham Gas Department had some few years ago carried out tests proving conclusively that coke was not injurious to a copper boiler. Regarding comparative costs of gas and coke, the decision whether gas or coke should be offered to consumers definitely depended upon local conditions. In regard to maintenance, he mentioned one firm which guaranteed firebars for three years. The difficulties which had been referred to must, in his opinion, be due to local conditions. Respecting possible loss of gas consumption by tenants moving from older buildings to modern buildings heated by coke central heating installations, he thought this development would continue and the difficulty would have to be met. In respect of maintaining sales of coke to purchasers of coke fires, records kept at Cardiff proved that this was satisfactorily achieved.

# Western Juniors at Exeter



Members of the Western Junior Gas Association visited Exeter on March 18, when they spent an instructive and entertaining afternoon at the works of Messrs. Willey & Co., Ltd.

Prior to the inspection of the works, a Paper was read by Mr. F. A. Rhead (Exeter) on "Some Technical Problems at Exeter Gas-Works." This, together with the discussion which followed will be dealt with in a subsequent issue of the "JOURNAL."

Following the meeting parties were made up to inspect the works of Messrs. Willey & Co Members were welcomed by the General Manager (Mr. C. H. Hitchen), who said they were pleased to be able to show their works to Gas Engineers and let them know what they could do. The thanks of the Association to Messrs. Willey's Staff was expressed by Mr. A. B. Horsfield, supported by Mr. S. B. Jones (Clevedon).

At the conclusion of the visit tea was served in the Staff Mess Room by kind invitation of the Directors.

# A Gasholder Inspector's Experiences and Conclusions

by
E. WHITTAKER,
of Robert Dempster & Sons, Ltd., Elland.

**From a Paper to the Scottish Junior Gas Association (Joint Meeting of Eastern and Western Districts), Feb. 25.**

Periodical inspection of gasholders first came into official prominence when the 1929 Report of H.M. Chief Inspector of Factories drew attention to "the need for the proper inspection of gasholders." On the recommendation of its Gasholder Committee and after consultation with the Home Office, The Institution of Gas Engineers issued a circular letter to members on Oct. 31, 1930, "emphasizing the necessity for adequate inspection and maintenance and the keeping of a systematic record."

By such procedure it was hoped the tentative suggestion "that the inspection and maintenance of gasholders should be subject to Government regulation" might be averted.

The first report of the Gasholder Sub-Committee published in October, 1932, outlined the method and extent of regular inspections they considered necessary. Notwithstanding the appeal for co-operation by voluntarily complying with the recommendations, the third Report of the Gasholder Sub-Committee published so late as November, 1936, showed that at 1,200 gas-works of which a census had been taken "satisfactory periodic examination of gasholders was being made in only 51% of such works, and that in the remaining 49% the examination was either inadequate or wanting."

It may be objected that in this census the percentage of holders actually examined would be much higher than that of works conducting examinations. Nevertheless we feel that the true comparison for judging the extent that the recommendation was adopted can only be on the basis of the number of works involved.

The further appeal in the third Report for co-operation in the application of the recommendations did not, as it was hoped, retard, much less reverse, the trend towards Government control, and periodical and thorough inspections were finally enforced on July 1 of last year by the new Factory Act of 1937.

The terms of the Act are now well known and need not be recited. In contrast there is, we feel, as yet little appreciation of the experience and valuable knowledge derived from work done to comply with the Act. The examinations have revealed unusual and occasionally perilous conditions prevailing which had not been noticed during periodical observations by works officials possibly unacquainted with constructional details of the gasholder interior. This extensive inspection work has given the gasholder contractor an unparalleled opportunity to obtain a mass of evidence by which to be decisively guided on matters of design, construction, and maintenance. Obviously, when in due course the inspections have become an established feature of works routine, defects will generally be rectified as quickly as they appear, even while their causes are possibly undiscerned, and consequently the ultimate significance of such repairs in terms of value to the designer in most cases completely obscured.

It is for this reason that we are taking the opportunity to record some experiences obtained during. and arising out of, inspections, which may be helpful to all who are concerned with the supervision and maintenance of gasholders.

The scope of our consideration, therefore, may be summarized as follows:

(1) Method of conducting external and internal inspections.
(2) Additions and modifications found necessary to facilitate satisfactory supervision and maintenance of the holders.
(3) Corrosion problems and investigation into the various causes of metal deterioration.
(4) Some repairs arising out of inspections, and reasons why they were necessary.
(5) Instances where design was fundamentally incorrect.

(1) *Method of Conducting Inspections.*

(*a*) The scope of the external examinations corresponds with the new inspection forms published by the I.G.E. All external portions of the holder, guide framing, and tank are surveyed, particular attention being given to corrosion, lubrication of carriages, horizontal spaces at cups and bottom curb, nature and extent of roller contact or clearances on the guides, and the levels of the tank and respective lifts.

(*b*) For internal inspections the holder is deflated, purged, the inlet and outlet pipes isolated by severing them, and tests made to ensure that the final traces of gas have been expelled. Where oil filming has been practised the oil is carefully skimmed from the water surface.

An airbox on which the outer doors can be opened and closed from either inside or outside, is fitted to one of the crown manhole frames, preferably the one nearest to the pipe where air is being injected.

When the gasholder has been inflated with air, the Inspector can enter the outer door of the airbox, close it from inside, remove the hinged manhole cover in the floor, and descend the rope ladder while he is fitted with safety jacket suspended from a winch secured to, and operated on, the outside of the airbox. Two rafts are used, one of which is moored to the gas pipe at the bottom of the ladder, while the other is available for proceeding to the points of inspection. Both rafts are provided with lifebuoy and boathook. Rescue apparatus comprising two sets of breathing apparatus, one resuscitator, and lifelines are kept in readiness on the crown. Men are stationed on the moored raft, and inside and outside the airbox to signal and be ready for any emergency.

All interior portions of the gasholder are examined, sample bolts removed from members at random positions to obtain representative judgment as to the extent of corrosion; cup carriages and paths of corresponding channel guides examined; disposition of dip blocks checked; top and bottom attachments of vertical stays inspected; condition of truss pipe and roof framing, and interior surface of crown and side sheeting examined.

Unusual points of importance are discovered on almost every gasholder, and the Inspector is kept keenly interested by the diversity of his findings.

(2) *Additions and Modifications Necessary to Facilitate Satisfactory Supervision and Maintenance of Gasholders.*

(*a*) Several holders are not equipped with ladders for access to the crown and dips, and even the experienced climber has considerable difficulty in ascending to grease carriage rollers. The absence of such access facilities is doubtless the principal cause of much neglected lubrication of carriages. New safety handrails and the supporting stands can be fitted to the crown and dips while the holder is in commission. It is to be emphasized, however, that the sheeting to which the new handrail stands may be secured must be sufficiently thick to resist rupture when the railing is used.

(*b*) There are several instances where gasholders have not been safeguarded by anti-freezers; some have injectors on tank balcony and dips with no connexion to the work's steam supply; others, usually at district stations, are fitted complete with circular steam main but without any possible source of supply. Equally important is the absence from old gasholders of anti-syphon valves near the injectors, permitting the possibility of sealing water being syphoned from the cups, due to condensation when the main stop valve is shut.

(*c*) Only an omniscient engineer could be positive that all his works plants were being satisfactorily lubricated. The

best possible assurance one can have, therefore, is obtained by providing the best facilities for access, and the most modern and interesting equipment for lubrication. Doubtless in your experience you, like us, have already concluded that the grease gun system seems psychologically to produce a spirit of interest and thoroughness not usual with other methods.

(3) *Corrosion Problems.*

(*a*) The new Act requires that where any gasholder lift has been in use for more than 20 years, samples from the crown and side sheeting shall be cut, and a report made upon the condition of them by the Inspector.

These discs taken from the body and at the lap edges of sheets will indicate with a reasonable degree of reliability the general condition of the interior surfaces.

Some authorities have advocated cutting large test strips from crown and side sheeting to obtain knowledge of the physical condition of the metal, whilst in America such strips have been cut and cover plates fixed with the holder in commission. This practice is, however, in our opinion quite unnecessary. From discs so small as 1¼ inches diameter cut with the trepanning tool we prepare specimens, and by means of the testing machine at our works subject them to tensile or Brinell tests, the machine in the former case autographically recording the load-elongation curve as the test proceeds. We are therefore able to prepare a complete report on the physical condition of the sheet metal, illustrating it with the actual test graph, charted for contrast if necessary, against a curve for mild steel of good quality complying with the British Standard Specifications. The same machine can be used for a number of other tests on members in the gasholder, and in fact on any metal or fabric likely to be encountered in engineering. The following are typical test results derived in this manner from gasholder discs:

| No. | Position of Disc. | Material. | Area, Sq.In. | Yield Stress, Tons per Sq.In. | Maximum Stress: Tons per Sq.In. | Breaking Stress: Tons per Sq.In. |
|---|---|---|---|---|---|---|
| 1 | Crown | W.I. | 0·0176 | — | 23·9 | 22·7 |
| 2 | Crown | W.I. | 0·0115 | — | 20·81 | 19·9 |
| 3 | Side | W.I. | 0·0082 | 14·2 | 16·48 | 14·65 |
| 4 | Side | M.S. | 0·0027 | 12·95 | 18·5 | 6·66* |
| 5 | Side | M.S. | 0·0070 | 14·30 | 24·3 | 17·15 |

* Curves marked "B" on graphs are plotted from these figures.

The results of test No. 4 have been plotted in two forms (see fig. 1). First, the stress in tons per sq.in. against elongation shows on curve "B" the physical deterioration of the metal compared with the standard curve "A" for mild steel of quality complying with the British Standard Specifications.

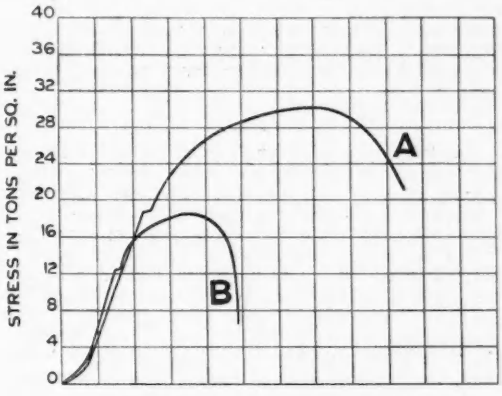
Secondly, the load in tons plotted against the elongation, shows on curve "B" the reduced strength resulting from the combined effect of physical deterioration and 75% loss of thickness by corrosion, compared with the British Standard Specification curve "A" for mild steel. The latter graph impressively emphasizes that the physical deterioration and corrosion combined have reduced the load capacity of the metal per unit width to 10%, and the elongation to 50% of their original values.

(*b*) Before benzole stripping was adopted, light oils were deposited on the interior surfaces of the crown and side sheeting and formed a protective coating. Cases can be recalled where erection marks painted on the inside of holders were clearly visible 50 years later; the rust was very slight and of a superficial character.

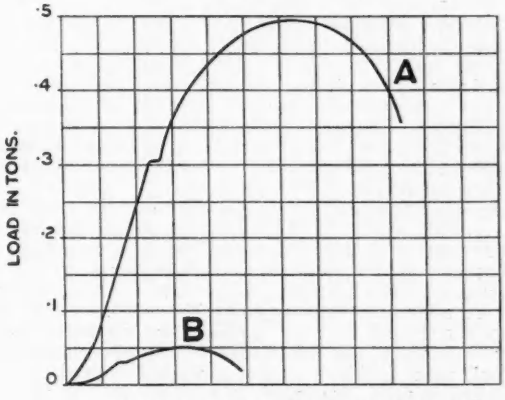
Since stripping has become general practice, we may expect that the protective coating will be absorbed by the gas, and oil filming will be necessary to prolong the life of the sheets. Carburetted water-gas deposits tarry oil on the sheets and preserves them; blue water-gas is aggressive, and the best sheeting will have a relatively short life unless one resorts to oil filming.

(*c*) We are not aware of any instances where a mild steel structure has failed, the causes of which have been actually traceable to surface corrosion. Some cases of corrosion we shall advance, forcibly illustrate how failure of highly stressed members could have occurred, had not the stringency of the new Act enforced thorough inspection before the conditions became critical.

It has been established beyond doubt that the simultaneous action of corrosion and stress will produce corrosion-fatigue. In particular, the theory of corrosion-fatigue is that stress alternations combined with corrosion will cause the formation of surface discontinuities or skin cracks. The fracture of metal due to corrosion-fatigue may occur at a stress much below the yield point of unaffected metal of the same kind and quality, even when corrosion may appear to be so slight as to be of no consequence. We understand the theory is being closely investigated by the Corrosion Committee of the Iron and Steel Institute. Meanwhile, any data appearing in Technical Papers will doubtless be carefully considered in relation to corrosion problems on gasholders.




Comparative Curves to show reduction in strength due to Deterioration of Metal only.




Comparative Curves to show reduction in strength due to the combined effect of Corrosion and Deterioration of Metal.

Fig. 1.

We allude to this factor because it emphasizes the advisability of preventing, as completely as possible the formation of corrosion. Consider now, with this in mind, some of the actual corrosion conditions we have had to report upon, and you will be impressed by the serious need to be scrupulously careful in actual practice.

(*d*) In several cases joist supports and underside of the bottom plate at pipe pits apparently had not received a coat of paint since the gasholder was installed. Layers of rust approximately ¼ in. thick could be removed from the plate surfaces, and in one instance the ¼ in. bottom plate when drilled and gauged was only ¼ in. thick.

It is now interesting to consider this actual example theoretically. Limiting the working stress to 8 tons per sq.in., and with a water pressure head in the tank of 25 ft., the

unsupported portions of ¼ in. or ⅜ in. plate between the joist flanges at the pit must not exceed 14·14 in. and 7·07 in. wide respectively. The reduced thickness of plate from ¼ in. to ⅜ in. has correspondingly reduced the permissible span to half width. Such considerations have ignored the additional possibility of metal deterioration.

(*e*) Frequently, we find the tank guides and the steel side plates of the tank corroded to wafer thickness at the tank water line. Pitting is most pronounced on the surface of the side plates around the heads of the top curb riveting. Thorough scraping and the application of non-drying pain. will prevent such conditions from developing.

(*f*) On steel tanks the side plates below ground level are liable to be impaired by the action of the mineral acids in the surrounding soil. Various methods have been proposed to avoid this trouble, such as laying a brick or concrete lining against the tank plates, leaving an open trench with retaining wall, or merely applying a good coating of asphalt or bitumastic solution to the plates and backing it with clay. Choice must depend on the site conditions peculiar to the contract in hand.

**Bolts.**

(*g*) Shanks of bolts securing together the principal members of gasholder guide framing are subject to corrosion unless completely sealed from atmospheric attack. Consequently, it is advisable to remove sample bolts to investigate their condition after the holder has been in commission 20 years, and while discs are being cut from the side sheeting. Bolts we have removed from ladders, girders, and in particular the internal flanges of cast-iron columns, bear witness to the advisability of attending to this point.

On one guide-framed gasholder during July, 1936, a top length of column guide tee with one cast crutch bracket attached, fell on the crown. Failure was caused by bolts securing the crutch brackets to the column being corroded from ¾ in. to ½ in. diameter at the shanks. The chipping strips on the crutch brackets bared the bolt shanks to atmospheric attack. Had representative bolts been examined at, say, 20-year intervals during the 70 years' life of the holder, the accident would probably have been avoided.

On guide-framed holders, the column bases to which holding-down bolts are attached vary considerably in design. Some bases include cast protecting pockets, and after 50 to 60 years' service the surface of bolt shank in this region is unimpaired. In contrast, where the base is of the open-cast type permitting rust to fall down the columns and accumulate around the unprotected shanks, they are reduced by corrosion to a marked degree.

One interesting case of this character can be cited. After 73 years of service a 2-lift column-guided gasholder in masonry tank was dismantled, and owing to the absence of cast pockets as described, the bolt shanks were badly pitted and reduced from 2 in. generally to about 1$\frac{5}{16}$ in. diameter at 2 in. above the tank coping. The adjoining holder of approximately the same size and age was dismantled a few years later, and it was found that the cast pockets preserved the bolt shanks without any evident deterioration.

(*h*) The designer has often unwittingly invited corrosion by arranging pockets and interstices inaccessible for painting, where rust accumulates and eventually begins to distort the adjacent steel members. On gasholders of obsolete design when such conditions prevail, we invariably advise that all ornamental rosettes be removed, rust carefully scraped from all interstices which are then cleaned and packed solidly with plastic bituminous cement.

Where wind girders or latticed standards have boom stiffening flats, the pitch of the securing rivets should not be too great, otherwise the flat will be sprung apart from the parent member between the rivets by the operation of riveting to an imperceptible, but sufficient, extent for the metal surfaces between to oxidize and produce results quite disfiguring to the general appearance of the holder.

(*i*) On some old column-guided gasholders we find bedplates under the crown carriages have been incorrectly designed and permit the collection of rainwater in totally enclosed and inaccessible pockets, with consequences that can be more easily imagined than described. The crown plate beneath becomes pitted on the surface, and in some cases actually fractures under load from the carriage roller and causes serious gas leakage.

(*j*) Cup leakage can develop from various forms of corrosion. Non-drying paint is now generally used for preventing corrosion at the wind and water line of the dips and cups. Now that this problem has been solved it is reasonable to expect that greater attention will have to be given to the lower portions of the cup in future. The water must be completely acid-free, and tests should be made periodically to ensure that such is the case.

While examining a large 4-lift gasholder recently we discovered on the cup plate adhesions which could be shelled off in pieces up to 4 in. long × ⅜ in. thick at the middle, tapering away to the edges. An analysis from a boring through the thickest part revealed that 64% was ferric oxide. On another holder depositions were found approximating to 1½ in. long. Although the water had been tested regularly, beneath several of these spots the cup plate could be penetrated easily by finger pressure. We are inclined to the view that in both cases the plates had been attacked by spent oxide blown from the revivifying floors nearby, and which had accumulated in the sludge layer. If our opinion is correct, doubtless the trouble will be most pronounced where a projector-type oxide disintegrator is employed, the gasholder located in line with the prevailing wind and on the leeward side.

Beside oxide, we may regard coal and coke dust, soot, yard clinker, and tree leaves as probably contributing to the sludge layers which generally become of considerable depth in a few years, unless removed regularly.

Occasionally the findings of an internal examination will contribute evidence related to cup corrosion, as for example on one gasholder, when several ⅝ in. rivets securing together the sections of pressed cup plates at the "half round," could be removed by the fingers due to corrosion of rivet heads by the cup sludge or water.

In another instance even an internal survey failed to give a true indication of the cups on a 3-lift holder Examined from inside the holder they appeared to be in sound condition; when the holder was put out of commission the bottom of the cups at the water-side was corroded so intensely as to leave only a wafer thickness of metal at some parts.

From these considerations it would seem to be essential to scrape thoroughly and apply two coats of paint to the entire surfaces of the cup and dip plates on every occasion that the holder is put out of commission.

A few instances can be cited where the bottom row of side sheets on the outer lift have been extensively corroded. Sludge of similar composition to that in the cups collects at the periphery of the tank bottom and on the horizontal flanges of the bottom curb angles. In one case, the bottom row of plates was cut through in an almost continuous line by corrosion, at a level lineable with the edge of the upturned flange of the bottom curb angle.

(4) *Repairs Arising from Inspections.*

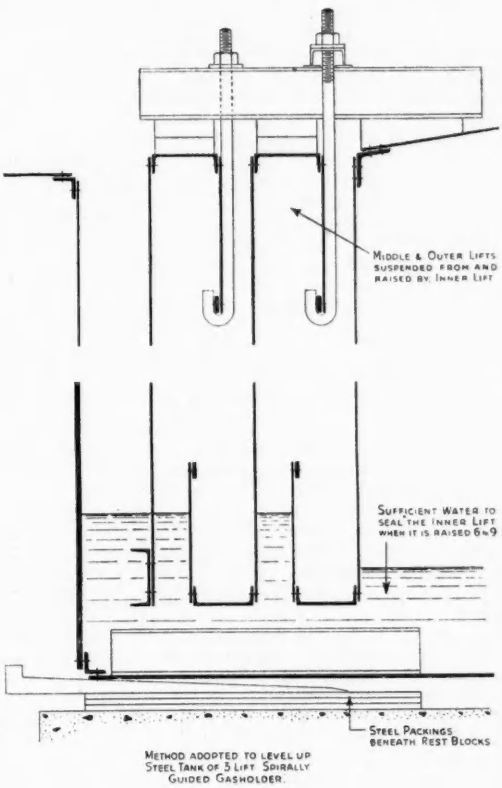
Many inspections have necessitated repairs of somewhat unusual character: a few likely to be of interest will be described.

(*a*) Some bottom carriages of guide-framed holders became detached and fell into the tank bottom, and some of the rollers were either completely out of the guide channels, or so far away from the contacting path as to render them useless for their purpose. May we take this opportunity to warn you not to re-adjust such bottom carriages on gasholders in masonry tanks, without consulting a gasholder contractor? Quite possibly, tank guides could be out of plumb in a radial direction in relation to the holder, and the resetting of rollers with usual clearances at the top position would inevitably cause jamming as the lift descended. Incidentally entirely new bottom carriages comprising cheeks, roller, and pin, can be fixed while the holder is in commission.

During inspection, the levels of the respective lifts often give indication that some cup rollers have become detached. In one instance of a 2-lift column guided holder, the inner lift floated out of true level to a marked degree when uncupped. From this we inferred that some cup carriages on the "high" side were missing, and it was definitely unsafe to uncup the holder. Moreover, most of the bottom rollers were either missing or too far from the guides to be of use, and

consequently when 2 lifts were working they were virtually guided only by the crown and outer lift dip carriages.

Special circumstances such as the one described may make it necessary to examine the cup carriages while the holder is in commission, in order to prepare a programme of work to be done later. In such case, two holes would be drilled in the top of the dip directly above each carriage; with the lifts just cupped and a powerful torch shining through one hole, the disposition and condition of the carriages beneath could be clearly observed through the adjoining hole. In


Middle & Outer Lifts suspended from and raised by Inner Lift
Sufficient Water to seal the Inner Lift when it is raised 6 in.
Steel Packings beneath Rest Blocks

Method adopted to level up Steel Tank of 3 Lift Spirally Guided Gasholder.

Fig. 2.

our opinion, new guide-framed holders should always incorporate this novel feature by having 2 gas plugs fitted in the dip channel over the cup carriages to enable them to be inspected.

## Re-levelling Holder and Tank.

(*b*) Where mineworkings or marshy substrata have caused the gasholder and tank to subside and incline badly out of level, it is unlikely that the cups will be sufficiently deep to seal the holder with adequate margin for wind disturbance and evaporation. The Insurance Company may therefore justifiably demand re-levelling of the holder and tank. A description of the method we used to re-level a large 3-lift spirally guided gasholder and steel tank, beneath which the foundation had cracked and partially subsided, may be of interest:

The holder was landed, purged, and the tank almost emptied, the duckfoot bends disconnected from the bottom plate, the exact positions of the rest blocks marked on the outside of the tank plates; the 3 lifts clamped together across the top curb and dips, and the composite lifts raised about 1 ft. as one unit by means of an air fan; several long "slow" wedges inserted and driven a small distance under the tank bottom in rotation, in each case 12 in. off the centres of the rest blocks, until the tank was raised to the normally level position; parallel steel packings of graduated thicknesses placed between the foundations and the bottom plates exactly beneath the rest blocks so that the holder when deflated would be uniformly loaded on them; the tank checked for level around the periphery; sand rammed tightly under the bottom as far towards the centre as possible; the wedges removed; the tank lowered on the new steel packings, and concrete rammed under the bottom plates to form a solid ring about 5 ft. wide beneath the lifts; finally the holder lowered off; the setting of all the carriages checked; tackle removed, and the tank refilled with water. The work was carried through expeditiously without any hitch, and we are gratified that no further subsidence has taken place.

(*c*) An order for renewing a carriage axle on a 3-lift spirally guided gasholder in steel tank, with the request that the axle be made 2½ in. longer than the original one, led us to suspect that behind this instruction there might be trouble much more serious than a carriage defect. Notwithstanding that the tank bottom was several feet below ground, investigations at site proved that the foundations had cracked and a portion subsided independently, owing to mine workings beneath. Consequently every time the outer lift was lowered, it landed on rest blocks not level with one another. This in turn caused deformation of the outer lift dip, and tension between the middle lift rail and the related carriage roller to such an extent as to fracture the axle.

In this case the fractured axle gave alarm of more serious trouble which could only be rectified by levelling up the tank and holder, or alternatively packing up the lifts level on the rest blocks and the tank carriages on the base plates.

We feel this incident is typical of many that have arisen since the introduction of systematic and thorough inspections. Hitherto, in many cases, the evident defects have been repaired, while the causes, possibly much more serious in their ramifications, may have passed completely undisclosed.

(*d*) On few works, we are sure, has it not been necessary to give attention to carriage repairs on both spirally guided and guide-framed holders since the introduction of the new Act. In the majority of cases the wear on pins or rollers has been normal, and nothing more than renewal, with possibly an improved system of lubrication, could be done. The Inspector may report excessive wear of carriage pins or roller bores, or that pins are rotating and wearing large slots in the carriage cheeks. Some rollers may be rotating off the true axis radiating from the crown centre, sometimes to such an extent as to grind holes in the cheek plates. These conditions must first be carefully analyzed by the Inspector before any repairs can be done, as sometimes they give warning of causes more serious. Guide channels may be out of plumb, carriages may be working in opposite directions circumferentially, with some rollers binding on the left and others on the right flanges of the guides, or foreign material such as cast-iron rosettes or stones in the cup may affect the roller contact and clearance readings.

(*e*) Where the coping of masonry tanks is at ground level, dust, soot, dead leaves, oxide, yard soil, and numerous other materials and works implements fall into the tank and accumulate around the outer edge. The depth of this deposit largely depends on the site conditions and the time that has elapsed since the tank was last cleaned. Several cases have been reported during recent years where the outer lift would not completely land on the rest stones, and even, in the case of multi-lift holders, the adjoining lift was similarly affected to a less extent. The positions of the oxide revivifying floor, coal and coke stacks, trees, and especially the direction of the prevailing wind, may cause the sludge to be deposited unevenly around the periphery of the tank. If the deposit is not of a uniform depth, the side sheets of the affected lifts will be buckled and the dips distorted from true circularity each time they come to rest. Moreover, owing to the outer lift standing high on the sludge, the rollers of the dip carriages will probably thrust upwards against the underside of the next tier of dip rollers as they come to rest directly above. This phenomenon causes a distortion of the dips of both the affected lifts every time they land, and the rivets and seams eventually leak at the points of deflection.

To avoid emptying the tank, an unchokeable pump can be used to eject the loose sludge, but it is difficult to dislodge that which has been repeatedly compressed on the rest stones beneath the bottom curb and cups, and which is the immediate cause of trouble. We believe this compressed sludge can be disintegrated by fitting a hard steel open-type pick fitting on the end of the suction pipe, but the measure of

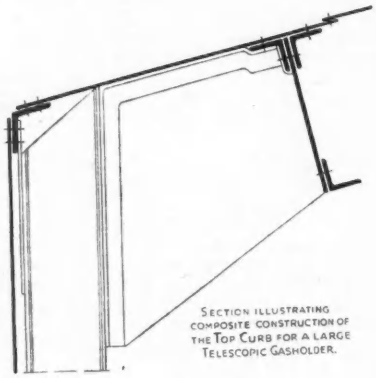
success will depend largely on site conditions and equipment available.

Some cases are on record where divers have been commissioned to enter the tank while the holder was inflated with air, break up the hard sludge, and control the suction pipe of the pump.

## Curb Compression.

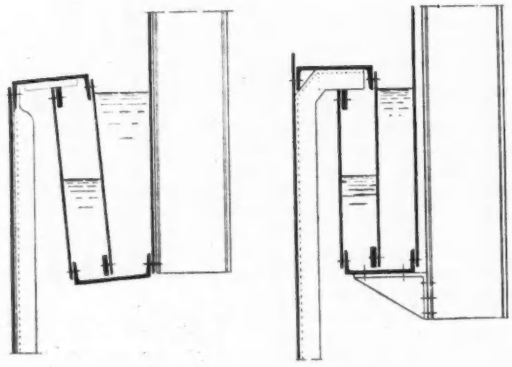
(5) *Defective Designs.*

(*a*) From the designers' point of view the composite top curb of gasholder, formed by the angle ring, part of the adjoining side and crown sheeting and, if such is necessary, an inner stiffening curb, is one of the most vital parts of the gasholder. (See fig. 3.) The curb must be capable of resisting



SECTION ILLUSTRATING COMPOSITE CONSTRUCTION OF THE TOP CURB FOR A LARGE TELESCOPIC GASHOLDER.

Fig. 3.



SECTIONS ILLUSTRATING DIP AND CUP DISTORTION AND THE MANNER IN WHICH IT IS PREVENTED.

Fig. 4.

the compressive load produced by the change of shape from the cylindrical side to the spherical crown and with an adequate safety factor. On some old multi-lift gasholders we have found the outer row of the crown and the top row of side sheets so very thin that the curb angle has virtually been the only section resisting the compressive load. Theoretically, the top curb will decrease in diameter, according to Young's law, in direct inverse ratio to the intensity of stress. Based on a Modulus of Elasticity of 13,000 tons per sq.in., the reduction will be at the rate of 1/10 in. for every 100 ft. diameter of lift per 1 ton stress per sq.in. Where, therefore, the stress approximates to a maximum of 8 tons per sq.in., the 100 ft. diameter of an inner lift will be reduced by ·8 in., and the clearances of the crown rollers increased accordingly.

We believe that in very extreme cases this reduction in diameter is actually discernible on the gasholder, where the top row of side sheets inclines from the vertical as the curb compresses.

If the age and condition of the holder justify the expense such a weak top curb can be stiffened up by fixing a supplementary inner curb 3 to 4 feet less in diameter on the top of the crown sheets, with slots cut away at intervals for draining the rainwater.

(*b*) Occasionally we have found very old gasholders with the crown sheeting completely riveted to the crown trussing and bracket bars. There must, in those early days, have been a failure to appreciate that the ideal condition would be to allow the crown to "balloon."

Of a similar character is the practice, not yet completely out of vogue, of securing the crown sheets to a centre ring at the top of the truss pipe. The sheeting is thereby restrained from "ballooning" to true spherical shape, and a well is formed at the centre crown plate which will collect water and present a constant problem to the painters.

(*c*) All guide framing should have diagonal wind ties. In some cases where the panels without ties are high in proportion to their width, and the connexions of girders to columns not sufficiently rigid to resist racking from wind loads, fractures have appeared in the entablatures of the cast-iron columns. Particularly is this likely to occur in top panels when the columns are of light construction, the top girders bolted together at the webs and to the caps of the columns only through the bottom boom angles.

(*d*) On multi-lift holders the weight of the hanging lifts on the second lift dip and first lift cup is considerable. Straining of the cups and dips on guide-frame holders by this loading does not materially affect their operation, and the only harmful consequences could be the gradual loosening of rivets and riveted seams, the metal of the cups becoming fatigued by frequent changes of stress, and the reduction of dip roller clearances even to the extent of producing heavy roller pressures.

On spirally-guided holders, however, such dip distortion can cause the carriages to bind, and particularly in the case of 4-roller type actually produce permanent strain of the axles and carriage bodies. This feature may be observed during inspections, and becomes a clear indication that on all new multi-lift holders, especially since holder pressures are generally much greater than hitherto, and the weight of the hanging sides with the added spiral rails correspondingly increased, all cups and dips with the exception of possibly those on the bottom lift should be securely bracketed to the respective vertical stays to prevent deflection. (See fig. 4.)

(*e*) An internal survey may reveal that the main bars are tilted over. The top boom of the main rafters is actually too narrow in section to transmit the compressive load without lateral collapse. The rings of bracket bars or purlins do not provide sufficient resistance, as they can rotate slightly in a clockwise or anti-clockwise direction and permit the top boom to bend. This undesirable condition is prevented by inserting, say, 2 or 4 sets of "kite" bracing—a form of horizontal flat bracing connecting the top booms of the main and secondary bars together to maintain the whole of the trussing truly in the vertical plane.

Another feature of incorrectly designed crown framing has been discovered on some old gasholders. In one case the crown framing partially collapsed; after careful examination the cause was ascribed to the diagonal compression members of the trusses being designed as tension members, and consequently failing owing to slenderness.

## Conclusions.

Let it be emphasized that in compiling this Paper the Author has not sought to emulate Mr. Pickwick's fat boy. In other words, here is no attempt to "make your flesh creep" with a recital of the various ills that may befall a gasholder. Nor is the fact that actual experience has been recorded in several cases to be regarded as suggesting that such conditions apply generally. Rather has the object been to show that the call for regular and efficient gasholder inspection is no mere fetish, but a very real necessity; and in this connexion to offer some observations and suggestions which, it is hoped, may not be without interest.

In the past there appears to have been an inflexible opinion in the Industry that the gasholder reached the climax of its evolutionary career with the advent and development of the spirally-guided type. The remarks we have submitted to you will show that even as far as guide-framed and spirally-guided holders are concerned, the contractor is still continually

improving the designs and benefiting by knowledge gained from practical experience and clearer theoretical insight.

The waterless gasholder is such a radical departure from the telescopic principle and has only been in use in this country for a relatively few years that the experience gained during inspections will not materially, in our opinion, affect its design or supervision, and it therefore does not come within the scope of this Paper.

Nevertheless the introduction of this type of gasholder into the sphere of our experience compels us to realize that we can never, in any department of the Industry, resign ourselves to the lethargy of disinterestedness, but must keep awake to the possibilities of advancements which, however small, will reflect credit on the Industry as a whole.

In conclusion, I desire to record my appreciation of the assistance given by my Chief, Mr. W. H. Handley, with advice and facilities to collect the substance of the Paper.

## Discussion.

**Mr. Cowie** said Mr. Whittaker had made them all realize that a holder had to have as much attention as the rest of the plant.

**Mr. N. C. Sturrock** said that in the past the gasholder had been rather the Cinderella of the works. The Factories Act had altered that, however. He asked Mr. Whittaker if the air box and raft method of inspection of the interior was permissible under the Act; also if he could give him any information as to the effect of sea air on the ironwork as a corrosive agent, and said that for the new holder being built at Greenock a copper-bearing steel was being used.

**Mr. T. Stirling** (Kirkintilloch) added his thanks and said that they had had trouble with corrosion near the lap edges of a water-gas holder and that considerable difficulty had been experienced in taking sample discs at these points. Mention had been made of benzole stripping, and he asked the Author if he could give any information as to the effect of dehydration.

**Mr. W. N. Baird** (Dunfermline) said they had made use of the services of a diver to enter a holder to effect repairs, and this had been done without interfering with the working of the holder in any way. A steel box with watertight doors had been constructed on the side of the steel tank, and the diver entered in this way. There were a number of small points in the design of a holder which called for attention, such as the fitting of railings to the side instead of the crown sheets of the holder, and he had a case where a gutter had been constructed round the crown. While this served its purpose admirably there was always some water or dampness in it. He said that he had had trouble with anti-freezers in that the flexible hose was found unsatisfactory. They had found steel piping with universal joint to be successful.

**Mr. A. C. Rea** (Perth) said that in Edinburgh he had had to put a number of old gasholders out of commission. In this case they had used steam to purge. Some of the holders were in a very bad state on the inside. He agreed that accessibility was an important factor for ensuring maintenance. Regarding the testing of the steel, he thought that a ductility test should be included. In the case of the Edinburgh holders mentioned, test pieces had been fractured with a very small amount of bending. He could bear out the Author's remarks in regard to markings on the inside of holder sheeting. He had seen the sheet markings on a holder lately which had been grounded for repairs. The markings were in red lead and this bore out a contention of his that a thorough base coat of red lead paint should be given to all steelwork. In Perth they had oil-filmed their holders when a dehydration plant had been installed; this also ensured a good protection against corrosion. He thought that holders should be insured, which meant that an examination of the holder was carried out by professional inspectors.

**Mr. Greig** (Glasgow) said that holder work called for expert attention. It had been customary in the past to give a holder a periodical painting and superficial examination and to leave it at that. He did not think that benzole stripping would have any marked effect on the sheeting, as he had had to put an old holder out of commission, and, though stripping had not been practised, no protective oil film had been discovered on the interior of the sheeting.

**Mr. D. N. Garrie** (Tayport) said that he had examined a holder some time ago and found that there were a number of holes on the north side of the holder. It had been presumed from this that more condensation had taken place on this side. He asked the Author if, when the standpipes were positioned, any attention was paid to the geographical positioning or was it a matter of convenience.

**Mr. J. B. Barker** (Leven) asked how Mr. Whittaker would advise the patching to be done in a case where a hole developed near a rivet.

**Mr. C. D. Blackhall** (Edinburgh) asked if any modification in design of holders would be made in the future in connexion with A.R.P. requirements.

## The Author's Reply.

**Mr. E. Whittaker** stated at the outset that it had to be borne in mind that this inspection of holders was a recent innovation and that before definite answers could be given as to the effect of oil-filming benzole-stripping, dehydration, &c., on holders, some time would have to elapse and information be collected from successive inspections on the same holders. In addition to this, local conditions would doubtless produce varying results. Answering Mr. Sturrock he said that the method and equipment for the internal inspections complied with the Factories Act. Copper-bearing steel, "Armco," and puddled iron were being used, but their relative merits could only be judged when the holders had been in commission for some considerable time. He explained with the aid of sketches the method adopted in taking sample discs from lap edges.

He thanked Mr. Baird for his remarks and expressed his interest in the method adopted at Dunfermline for making use of the services of a diver. He said that he had had no complaints regarding armoured hose used in connexion with anti-freezers.

With regard to Mr. Rea's remarks about ductility, he thought that this was covered by the tests described where elongation curves shown gave a true indication. He did not think that geographical considerations were ever regarded when fixing the position of the standpipes. These were arranged apart to ensure efficient mixing and, of course, to suit the direction of the approaching mains. With regard to Mr. Barker's question, Mr. Whittaker said he would patch over the rivet seam to make a satisfactory job. He did not think that any alteration in design would be made for A.R.P. requirements; he thought that these would be covered by painting and that this was a job for the local people and not for the contractor.

# Gas Undertakings' Results

## Hong Kong.

The report of the Directors of the Hong Kong and China Gas Company, Ltd., for the year ended December last, states that the quantity of gas sold was 165 million cu.ft. at Hong Kong, and 93·2 million cu.ft. at Kowloon. In both cases these figures show a satisfactory increase over 1937, in which year the sales were 160·4 million cu.ft. at Hong Kong and 83·5 million cu.ft. at Kowloon. Out of the balance of net revenue the Directors recommend the payment of a dividend for the past twelve months of 5%, which is the same as was paid a year ago. The average rate of exchange during the year was 1s. 2⅞d. per dollar, as compared with 1s. 2 1/16d. per dollar average for 1937.

## Prescot.

The Directors of the Prescot and District Gas Company, in their report for 1938, state that steps are being taken to obtain an Order authorizing an increase in the capital of the Company, in view of the considerable expenditure under this head. An addition during the year of £7,218 to the total expenditure has brought the balance at debit of Capital Account to £17,630. On the present occasion the balance of revenue carried to Profit and Loss Account is £5,072, as compared with £4,237 a year ago. Receipts from sales of gas to private consumers were £22,266, against £20,337 in 1937. The dividend on the consolidated ordinary shares is at the maximum rate of 5%, which will leave a balance of £4,253—or about £400 more than last year.

## Sydney.

The capital of the Australian Gas Light Company, whose headquarters are at Sydney, was further increased during the past year by the creation of 35,000 "A" shares. The dividend for 1938 of 6% on the "A" and "B" shares will leave a balance to be carried forward of £57,080, which compares with the sum of £45,373 brought in. The balance of revenue carried to Profit and Loss Account is some £18,000 up at £393,555. Sales of gas to general consumers, at 0·428d. per Gas Unit, realized £2,070,425. In 1937 sales of gas to general consumers, at 0·392d. and 0·428d. per Gas Unit, totalled £1,905,747. Coke and tar realized substantially less in the past year, but the return from sulphate of ammonia is nearly £7,000 up, at £21,257.

# The Servicing of Gas Apparatus - - -

by L. F. RANDALL,
of the South Metropolitan Gas Company.

From a Paper to the London and Southern District Junior Gas Association, March 14.

Nothing in this world is perfect, and everything requires attention at some time; gas appliances are, unfortunately, no exception to this rule, and if the Gas Industry is to maintain its progress the practice of "fit and forget" must quickly disappear. We have always paid close attention to the necessity of this service, and have always made it a practice in our charges to allow for the cost of servicing an appliance during the period of any hire or hire-purchase contract. We have adhered strictly to this rule, as we consider it a necessary safeguard in ensuring the continuous satisfaction of the consumer.

The term "servicing" is a very wide one, but for the purpose of my Paper I have assumed it to mean the rendering of skilled attention at predetermined times, in order to ensure that an appliance shall continue to function efficiently. The system of operating any scheme of this nature must, of course, depend on the number of appliances for which it caters, as well as the service it is intended to give, which will naturally vary with every undertaking.

The work carried out by the average gas fitter is comprehensive, and in many instances he acts as the servicing fitter in addition to his other duties; but I consider that if circumstances permit a separate staff should be formed. The servicing staff should be specialists at their work, and they quickly become so by being carefully trained, and by accumulating experience by being solely engaged on this particular work.

A well-trained man practically develops a second sense in detecting troubles, and great care, therefore, should be taken to make certain that the men selected for this work have a comprehensive training.

Apart from general training, refresher courses should be held from time to time, when the service fitter is instructed in the approved method of servicing all new appliances which have been placed on the sales list, and also of any variations or modifications of existing ones. By this means his knowledge is kept up to date while, at the same time, the district service instructors are able to learn of any particular difficulties experienced, and by doing so remedies and solutions can usually be found. The fitters themselves, due to their close examination of appliances under working conditions, are also often able to suggest improvements which materially assist in overcoming small difficulties found during servicing.

The object should therefore be to co-ordinate all information on this subject and endeavour thereby to make the service as efficient as possible. This information also enables a definite and detailed routine to be prescribed which the fitter must observe when making a service call. In most instances one or two service visits are made each year, during which the fitter will often find that the consumer expresses complete satisfaction with the appliance, and apparently there is not much need for attention. The fitter must, however, anticipate possible future trouble, and by keeping to the routine servicing the probability is that the appliance will function correctly during the intervening period until the next service visit. Adherence to this routine not only prevents annoyance to the consumer, but, in addition, saves the expenditure involved by having to make further servicing calls.

## Lighting.

We have always paid considerable attention to the servicing of lighting fittings, because not only is the lighting burner the most sensitive in its operation, but if it is neglected, it can be a bad advertisement for gas appliances as a whole.

Our consumers are offered the option of three services.

(1) The servicing of any single nozzle burner for the sum of 3d. each visit; this service includes cleaning the burner and glassware, provision of a new mantle if necessary, but excludes replacements of any further parts.

(2) The provision of all labour necessary for cleaning the burner for the sum of 1½d. each visit. The consumer has to provide, or purchase from the service fitter, any new mantles required and any replacements of burner parts.

(3) The provision of labour for cleaning the lighting fittings at the rate of 1s. 6d. per hour, exclusive of all material; this applies chiefly to large installations.

For commercial use a selection of approved indoor and outside lighting fittings are offered on hire terms, which are inclusive of servicing. The servicing in this instance includes everything except replacement of parts due to wilful damage. This system is of great advantage, as the care of the installation is left entirely in the Company's hands, and by servicing the lamp once each month the installation is always kept at a high state of efficiency and is always ready for immediate use. In addition to the fact that the hiring terms include a complete service, the consumer is not irritated with charges for extras.

For the external shop lighting in those parts of the area where high-pressure mains are laid, 500 or 1,000 candle-power high-pressure lamps are available, and in this instance the whole of the installation is supplied, including all fixing, gas, and servicing. The charge made is based on the size of lamp and the number of hours during which it is to be lighted. Each new installation is subject to a suitable agreement whereby the consumer undertakes to keep the lamp for a definite minimum period.

A free maintenance service is also available to those slot consumers who purchase gas at the full slot rate, but this, of course, is limited and applicable only to burners in rooms which have good use.

## Cooking.

One service visit is allowed each year in connexion with the servicing of cookers, which includes:

(1) Cleaning all burners and nipples.
(2) Checking burners for combustion, and examining ventilation of oven.
(3) Replacing worn-out burners, hotplate bars, and cleaning and adjusting any lighting device fitted to the cooker. Any replacements additional to those mentioned are charged for as extras.

In every instance where a new cooker is fixed, which is fitted with an oven temperature regulator, a lady home service representative calls upon the housewife a few days after the cooker is installed; it is her duty to explain, if necessary, the correct use of the stove and give advice as to the best methods for keeping it in a satisfactory condition.

It is found that if the housewife, who is naturally pleased with her new purchase, is educated in these matters at the beginning, the chances are that she will make a regular habit of following the advice given.

These home service representatives are also employed in attending to complaints which concern the performance of the cooker, as they are in a position to advise the housewife on all cooking matters. They have also been trained in simple servicing requirements, and if they find there is some slight defect in the stove, such as a choked jet, they are often able to correct the trouble on the spot, thus obviating the necessity of sending a fitter to the job. If the service required, however, is greater than they can perform, they are usually able to report definite details of the defect, with the result that the servicing fitter can be sent with any parts required, and the work can be completed without delay.

These ladies are also able to advise housewives on the general uses of gas in the home, on matters such as home laundry and the use of refrigerators; and the functioning of the service generally is most helpful in developing friendly relations between the Company and its consumers.

The main servicing of cookers is, of course, carried out by

the service fitters, and when a service request is received, a fitter who is termed "first call man" is sent. If the service is simple he attends to the complaint immediately and puts the matter right. If, however, he finds that new parts are required, he enters the details on the back of his work card. This enables a service fitter to call later with the correct material, and for the repair to be carried out with a minimum of inconvenience to the consumer. If the "first call man" finds that the cooking stove is past repair, the matter is referred to the representative for the district, who arranges with the consumer for the cooker to be exchanged.

One service visit is allowed each year for gas fires, radiators, and portable heating appliances, and the schedule of service consists of:

(1) Cleaning burner.
(2) Renewing radiants, if required.
(3) Examining combustion.
(4) If heating appliance is fitted with a flue, to ascertain if the flue is functioning correctly; if not, to disconnect appliance and clear flue of any local obstruction.
(5) If appliance is fitted with lighting device, to test, clean, and adjust.

Parts other than radiants are not included in the servicing cost.

The servicing of the above-mentioned appliance, wherever possible, is carried out during the summer months, in readiness for the heating season; also at this time of the year work on the district usually slackens off, and we are able to transfer some of the district fitters to this work, so as to speed up the rate at which the servicing is accomplished.

For many years rental gas fires have been supplied with standard radiants, and this factor has made for economy in servicing for the reason that service fitters while on this work carry with them boxes fitted with wire racks in which a large number of the standard radiants can be packed. The fitters become more or less self-contained units, and can move from job to job with the minimum delay. In the case of those fires fitted with radiants other than standard the local depôts hold a fairly comprehensive stock, which enables the fitter each morning to draw out those pieces he found to be required during his previous day's work.

In instances where the fire is not on rental or on hire-purchase from us, it is the practice to provide the labour required for servicing without charge, and the consumer pays for any material found to be necessary.

## Water Heaters.

The number of visits allowed each year for the servicing of water heaters is as follows:

| | |
|---|---|
| Instantaneous heaters .. .. | 2 |
| Circulating boilers .. .. | 1 |

The fitters are provided with a complete set of tools, including a stop watch and thermometer, and the standard servicing for instantaneous water heaters consists of:

(1) Cleaning the heating element.
(2) Cleaning burner, automatic valve, safety devices, pilot jets, &c.
(3) Renewing springs, washers, and diaphragms, if necessary.
(4) Checking gas and water rate.
(5) Cleaning flueways and making sure that flue is functioning correctly.

The waterways in the heating element are de-scaled when necessary on the job by means of wire brushes; but when this mechanical method is unsatisfactory the heating element is exchanged and sent back to the repair shop, where it is chemically de-scaled and re-tinned.

It is considered inadvisable to de-scale chemically in a consumer's house, as not only is there a risk attached to the use of acids, but the process takes far too long. By returning the element to the repair shop the whole work can be carried out much more thoroughly. There are, of course, many special de-scaling solutions on the market which get over some of the difficulties, but the use of them does not overcome the time factor.

In the case of circulating boilers, the servicing consists of:

(1) Cleaning the burner and replacing defective jets.
(2) De-scaling the interior and supplying new joint rings to manholes.
(3) Checking the accuracy of the thermostat.
(4) Examining the flueways and making sure that the flue is functioning correctly.

The method of installing water heaters has a very large influence on the cost of the work of servicing—first, from the aspect that if the flue equipment and water supply pipes are badly planned the appliance works under inefficient conditions, and consequently deteriorates much more quickly; secondly, if consideration is not given to the provision of local control cocks on the cold water supply, much time will be wasted by the service fitter in making arrangements for shutting off the supply; and thirdly, if the appliance is fitted in a position where it cannot be removed without breaking a flue connexion, a suitable joint must be provided. In the latter instance a split socket is used with cement flues, and in the case of galvanized flues, a special "slip socket" is used which can be slid up the adjoining piece of pipe and thus enable the machine to be removed.

## Refrigerators.

Two servicing visits are allowed for each year, during which the flueways and burner are cleaned and the combustion checked. Any other minor complaints are also attended to; but if it is found that the service required is beyond the scope of the servicing fitter, a special mechanic is sent from the repair shops to attend to the trouble.

It is also customary to send a home service representative to call on the housewife immediately a refrigerator is fixed, in order to explain and demonstrate the correct use of the appliance.

## Power.

The competition in regard to the power load makes it one of the most difficult to hold. The gas engine has always been a patient and trustworthy prime mover, and because of these attributes it is often neglected by the owner; this does not naturally apply to large users who have their own engineers on the staff. Experience has shown us, however, that in many instances the load was lost to a competitive source due to the fact that the gas engine ran with minimum attention for a large number of years, until the time came when, due to wear and tear, it was no longer able to take the load or a complete breakdown occurred. The cost of reconditioning when this happens is often very heavy, and the user is tempted to turn to the comparatively cheap installation of an electric motor, even if it means an increase in his power costs.

In order to try to prevent this from occurring, for some time past a scheme has been in operation for servicing gas engines. A small staff of experienced engine fitters are employed whose principal work is to maintain the many gas engines used for driving our own plants, such as high-pressure lighting compressors, &c. By augmenting this staff gas engine users were offered a servicing scheme whereby a skilled engine fitter could service the engines periodically at a fixed charge.

The service covers grinding in valves, cleaning and adjusting ignition and oiling devices, checking over the timing, and making any small adjustments; all material used is charged as an additional cost.

This scheme ensures that the users of gas engines will always get the best out of them, but it is also helpful in another direction. These periodical servicing visits enable the fitter to watch the mechanical condition of the engine, and when renewals become necessary arrangements are made for estimates to be submitted for the work. It is found that not only is the consumer more ready to agree to an expenditure of, say, £10 each year, rather than to a large sum at less frequent intervals, but also that if repairs are done immediately they are shown to be necessary the efficient life of the engine is naturally extended.

In addition to this service, the advice of an experienced consulting engineer is available when required, and by means of indicator tests, &c., he is often able to help the user to overcome difficult problems which occur from time to time.

In large plants, particularly, the use of these tests for obtaining correct valve settings and ignition timing has often enabled the user to obtain better working efficiency, which would probably not otherwise have been possible.

## Cost of Servicing.

The multiplication of various makes, designs, and patterns tend to lead to difficulty, and influences the general cost of servicing. On one hand, our sales departments desire always to place the latest appliances in front of our consumers, while on the other, the service department is faced with the task of servicing these numerous appliances during the years following their installation, and at the same time maintaining a stock of spare parts for renewal when necessary. Long-term hire-purchase arrangements demand this, and in many instances the long life of many gas-burning appliances also makes it a necessity. I feel that our Industry must, to some extent, follow the modern policy whereby an article must not be built to last, but must be built for early redundancy. If this were possible some of our difficulties would be solved, and then I anticipate it would be more economical for an undertaking to offer a part exchange figure for an old appliance when substituting a new one, rather than be forced to hold large stocks of spare parts for a period of years.

The cost of servicing is influenced mainly by the following factors:

(1) The number of appliances to be serviced and their geographical situation. The greater the number of appliances on the district will usually mean that the cost of servicing per unit will decrease; also if the appliances are situated close together then walking and non-productive time will be reduced to a minimum.

(2) The type of labour employed for the execution of the work. It is advisable that the men employed should hold the same status as district fitters, as it is important to use the highest grade labour on a service which maintains the goodwill between consumers and the undertaking.

(3) The extent of liability covered by the servicing contract. In this instance we should try to cover every contingency which is likely to be met in the normal life of an appliance; consequently, our service should cover repairs and replacement of parts which are likely to cause trouble during that time. I do not think that this will involve so great a risk as appears at first sight. For example, from an analysis taken of 9,000 sink heaters in use, it was found that in one year the Company was called upon to supply the following parts:

90 new bodies.
11 new burners.
98 repaired burners.
27 new water housings.
100 new taps.

In addition there was, of course, the supply of washers, diaphragms, pilot tips, gas valve springs, &c.

When computing a servicing charge, however, these factors are taken into consideration and the following figures will give some guide as to what a servicing scheme such as I have outlined would probably cost per annum for each appliance:

| Appliance. | s. | d. |
|---|---|---|
| Sink heater | 5 | 6 |
| Multi-point water heater | 11 | 0 |
| Geyser | 6 | 2 |
| Circulating boilers (large) | 10 | 0 |
| Cookers | 4 | 0 |
| Cookers with lighting devices | 5 | 0 |
| Fires | 2 | 9 |
| Portable heaters | 1 | 9 |

The figures may appear high, but if the service is comprehensive and efficient, the consumer does not mind paying for it; and it is much better to endeavour to make the cost include all reasonable replacements than to lower the cost and irritate the consumer with extra charges. While I am sure you will agree with the desirability of this policy, it is not always an easy matter to persuade the consumer to adopt it.

It is the general practice in all hire-purchase agreements to include in the total price the cost of servicing during the period of the agreement, and in some instances a limited period of free servicing is given if the appliance is purchased for cash; but when this period expires or the consumer purchases a house in which appliances are already fitted, then it is necessary to persuade the consumer to sign a servicing contract.

In instances where objections are raised, or where the financial state of the consumer is such that it is unlikely they will be able to meet the account when it is rendered annually, an offer is made to allow the servicing cost to be paid for by instalments. If this cost is, say, 11s. for two visits a year, then this is divided into two payments of 5s. 6d. payable with the next account rendered after the servicing; alternatively, in the case of monthly accounts, twelve monthly payments of 11d. may be made. In the case of slot meter consumers where collections are made every six weeks, the charge is proportionate to this period.

If the appliance is not new, or has not been previously serviced by ourselves—*i.e.*, under a hire-purchase or similar agreement—the Company insist that it is inspected first to ascertain that it has been installed correctly and that it is in reasonable order; otherwise, the consumer is asked to pay for the machine to be put in good repair before the servicing contract commences. If it is found that the machine is not on the approved list, then servicing on a contract basis is not undertaken.

## An All-In Scheme.

As the number of appliances installed increases it should be possible to reduce cost of servicing each unit; and if this is possible, I consider the aim should be to formulate an "all-in" servicing scheme which will cover every appliance in the house The cost of such a service would have to operate on the principle of "swings and roundabouts" in order to get down to a low price applicable to all consumers. If this could be, say, 12s. a year, payable at the rate of 1s. per month, or 3s. per quarter, with the gas bill, I feel sure it would be very attractive. I doubt whether it would be possible, however, to give such a comprehensive service as that I have described, but if a typical installation is taken comprising, say, a cooker, water heater, refrigerator, and two gas fires, a considerable amount of service could be covered by this charge.

It would, of course, be necessary to lay down precisely what such an "all-in" service covered, but whatever the limitations are, I am convinced it would give a consumer great satisfaction to feel that all the appliances in his house were being regularly examined and cleaned by an expert. Such a service would also have another useful function in that the service fitter could report on the condition of the appliance in use, and when any appliance is getting near the end of its useful life, immediate approach could be made to the consumer with a view to selling a more modern one. Such a scheme, therefore, would act as an excellent "intelligence service" to the sales staff and should be very helpful in combating competition.

## Discussion.

The **President** (Mr. S. C. Waldock, Gas Light and Coke Company) said that Mr. Randall had given them a most interesting Paper, picturing the policy of the South Metropolitan Gas Company and putting forward suggestions which would lead to a good discussion. The need for servicing gas apparatus would be generally agreed; but some, perhaps, might have their own ideas as to the function of the service fitter, the charges to be made, and whether specialized fitters should be employed for each different class of apparatus. He enquired whether men who made useful suggestions were rewarded in any way; many undertakings had suggestions boxes, and sometimes suggestions received awards. In the Gas Light and Coke Company they had a special service manual which was very useful, and he would like to ask Mr. Randall if such information was available to his fitters in addition to the data sheets. Did the South Metropolitan Company try to arrange for the first-call man to make the second call if one was necessary? Looking at it from the consumer's point of view, it was rather irritating to have to go through the whole rigmarole of explaining the trouble to the second man. Mr. Randall had mentioned labour-free service for fires privately owned; he presumed this was available to all consumers without distinction. Also, were such inspections regular or only when the consumer sent for them? Finally, the President asked whether the servicing of all the gas appliances in a house was carried out in two calls, or did it involve one a year for the cooker, one for the fires, and

two each for refrigerators and water heaters—making six calls in all?

**Mr. Randall** said that the first-call man did not call again. He was followed up by the service fitter. He fully appreciated the President's point, but there was another side of the question—namely, that the first-call men were fulfilling an emergency service; they got to the job quickly and if they could not put the trouble right themselves—if, for example, it involved obtaining spare parts—they told the consumer that a man would be sent to complete the repair the following day. Some people might complain that this was not *immediate* service; but it was the best they could do without having a service van, fully equipped with all spare parts, available for every complaint! The first-call man, moreover, was an expert and rarely made a mistake over the spare parts he ordered. Consumers' own fires were not serviced regularly unless there were Company's fires in the same house; then the fitter, after servicing the Company's fires, would offer to service the others free of charge to the consumer unless replacements were required. The South Metropolitan Company issued a Technical Bulletin at infrequent intervals containing information to back up the data sheets.

## "Fit and Forget."

**Mr. T. G. Noble** (Gas Light and Coke) challenged Mr. Randall's contention that the practice of "fit and forget" must quickly disappear. Surely, observed Mr. Noble, it should be one of the objects of the Gas Industry to provide appliances which they could "fit and forget." Mr. Randall had not, he thought, sufficiently stressed in his Paper the aspect of servicing which concerned the safety of the consumer; this should have first consideraiton in all circumstances. There was a slight suggestion that they should go on giving continuous satisfaction to the consumer—until he was dead! Anotner point on which he felt rather doubtful was the suggestion that fitters should anticipate possible future troubles. While he agreed that, given the perfect fitter, this might be good practice, they were liable by following this rather risky proceeding to reach a point when, say, a gas water heater would be completely dismantled every time a maintenance call was made. In theory it was admirable to clean the automatic valve and safety devices each time, but it was likely to lead to a valve which was previously working perfectly satisfactorily being put out of action. Mr. Noble saw no reason to give attention to a valve which was working satisfactorily. He was not quite clear, in connexion with servicing water heaters, what the Author meant by "making sure that the flue was functioning correctly."

**Mr. Randall** stated that this actually meant examining for blockage.

**Mr. Noble** went on to refer to de-scaling. remarking that he thought they must expect the use of chemical de-scaling to increase rather than decrease in the future. The suggestion that chemical de-scaling should be carried out at the depôt was one which had much to commend it, but he thought Mr. Randall had somewhat over-emphasized the danger of using acids in consumers' houses. The other point was the time involved; he thought that many chemical processes were actually quicker than mechanical ones done on the consumers' premises. He did not see why they should be afraid of using chemicals on consumers' premises when it was the regular practice in regard to solid fuel boilers. Furthermore, if circulators were taken to the depôt it would be necessary to provide another appliance each time it was de-scaled. Did he understand that the de-scaling of circulators was carried out annually?

**Mr. Randall** replied that the de-scaling of circulators was only carried out at intervals—when it was found to be necessary.

**Mr. Noble** went on to speak of the fitting of stop-cocks on the cold water supply; he agreed that such a practice was desirable on most appliances, but he could not help feeling that there were already so many different cocks and controls on a gas water heating system that the provision of yet another was going to lead to a rather untidy installation. Turning to the costs of maintenance, Mr. Noble said he wished he could agree that the consumer did not mind paying for it. He was not suggesting that the figures quoted were the lowest or the highest he had experienced; but he would say that some undertakings' costs were higher. To suggest that the consumer could ignore an on-cost of 2d. or 3d. per therm, together with further charges for replacements, seemed to be rather optimistic. Mr. Noble was not quite clear whether these costs were intended to include attention to complaints which occurred between the regular service calls. If not, he would be interested to know what sort of costs they had in connexion with complaints.

**Mr. Randall** said that the policy of "fit and forget" was not very prevalent in the London area; but his experience of many undertakings outside London was that service was given only on direct application from the consumer. The question of chemical de-scaling in consumers' houses had occupied a great deal of attention, because, while there were advantages they had found that time was very important. The figures he had given were comprehensive ones covering complete service. Their desire had always been to try to give the consumer complete service, even to the re-tinning of the heating body in the case of water heaters and the provision of any part which they could see would require renewing before the expiration of seven years' life.

The tendency in the Gas Industry had been to give free service; but their experience was that if they offered a comprehensive and efficient service the consumer did not mind paying for it. It was not possible to get every consumer to agree to this servicing system, but in the case he had quoted of an artisan estate over 90% came in—and these represented consumers whose earning capacity did not exceed £3 10s. or £4 per week. This was due to the fact that the Company were able to offer the service at 11d. per month. To compare this cost on a thermal basis was not a correct way to assess the service offered. It was not his intention to convey that stop-cocks should be fitted on sink heaters, but only in cases where the absence of one resulted in difficulties in servicing. They did not fit cocks at all unless the fitter reported that he had found it difficult to shut off the water supply, in which case it was obviously worth the extra expense.

## Maintenance Contracts.

A **Member** enquired as to Mr. Randall's experiences in persuading consumers to sign maintenance contracts on the expiration of hire-purchase agreements. He had stated at one point that the consumer did not mind paying for servicing, and a little further on he said it was not always easy to persuade consumers to adopt it. The speaker personally found it extremely difficult to persuade consumers to enter into an agreement even on such easy terms. When hire-purchase contracts expired it was his undertaking's policy to write a letter to the consumer advocating a regular maintenance service; but the response was practically negligible. They used to send an inspector along to try to get the consumer to enter into the maintenance contract, but they found it complete waste of time. The consumer was not interested in a contract which involved a surcharge. While people did not object to paying for luxuries, they did not seem to feel the same way in regard to the necessities of life. The speaker considered that the maintenance charges should be made in the cost of gas. They maintained mains and services at a price included in the cost of the gas, so why not appliances? He went on to quote the following figures relative to the attention which had been found necessary in his undertaking to the various classes of appliances:

| | |
|---|---|
| Cookers | One visit in 5·73 years |
| Fires | " " 17·6 " |
| Radiators | " " 2·0 " |
| Wash boilers | " " 22·5 " |
| Water heaters | " " 1·75 " |
| Coke grates | " " 22·0 " |
| Refrigerators | Two visits a year |

From these figures it would be seen that water heaters and refrigerators required the most attention—which appeared to be a condemnation of any all-in scheme. This, however, was not really the case. He was not sure that it was wise to include the cost of replacements except during the period of hire purchase. His experience was that consumers objected less to paying for something tangible than for labour. He assumed that the average cost of servicing appliances on the basis of one visit per annum, except for water heaters, was 3·2d. per annum, which was equivalent to 0·29d. per therm.

**Mr. Randall** said that it was difficult to get maintenance contracts signed immediately upon the expiration of the hire-purchase period. But they often had to wait only until the first trouble occurred with the appliance, and having pointed out the advantages of regular maintenance service, they almost always succeeded in getting the consumer to sign the contract. The inclusion of a comprehensive maintenance service in the price of gas was admirable in theory; but there were many attendant risks. With mains and services the gas undertaking could decide what maintenance was necessary; but with appliances they might find the consumer considering himself entitled to greater service than the undertaking was prepared to give.

**Mr. C. F. Petersen** (Bournemouth) remarked that their complaints department was called the service department. When a complaint was received in regard to an appliance which was under regular maintenance service was the matter dealt with by the regular maintenance man or by a special complaints fitter?

**Mr. Randall** replied that when a complaint was received in regard to a water heating appliance a complaints man with a motor bicycle went along immediately, and the matter was attended to very quickly. If he found the job a difficult one a hot water fitter followed.

## Co-ordination of Services.

**Mr. Petersen** said that the difficulty was to co-ordinate the different maintenance services when certain appliances required attention twice a year and others once a year, and the refrigerator, in his experience, three times a year. In addition to their maintenance fitters, his Company had a fittings inspection staff who got round the whole district once in three years; the latter tested and cleaned all appliances entirely free of cost, charging only for replacements. He had worked out the cost of servicing instantaneous water heaters in his area, and this came to 2s. 3d. each per annum after allowing 5s. in the hire-purchase or cash

price. They allowed one year's free maintenance on cash purchases and full term maintenance on hire purchase. He asked if Mr. Randall considered a seven-years' hire-purchase agreement desirable for instantaneous water heaters, and, if so, should the cost of new parts be allowed for in the hire-purchase price?

**Mr. Randall** said he was interested to hear Mr. Petersen's suggestion that three visits a year were necessary for refrigerators. His own experience was that if the appliance was fitted in a cold position it was essential for the flue to be cleaned three times a year; but if it was fitted in a warm position, where condensation did not occur, twice a year was sufficient.

Deposits were formed at the point where the aluminium flue joined the top of the boiler tube, and this caused the tube to become blocked. Generally they found that two visits per annum were necessary. The amalgamation of the various maintenance services was usually achieved by first of all combining water heaters and refrigerators under one service, leaving cookers, fires, and radiators under another. By employing high-grade labour Mr. Randall thought it should be possible eventually to combine all appliances under one scheme, when it should be necessary to make only two visits per annum. Although it was desirable to overhaul fires in August or September, that would not always be possible in an all-in scheme. However, the servicing of gas fires at any time was better than not at all. The figure of 2s. 3d. was very interesting; many of them would recall Mr. Leopold Friedman's Paper to the Western Junior Gas Association in which he gave a figure of 4s. 3d. based on 500 multipoint heaters, 500 bath heaters, and 1,000 sink heaters. These figures were very accurately computed and did not account for replacement of all parts or intermediate calls other than the two special service visits. The desirability of putting appliances out on seven years' hire purchase must depend in the first instance upon the undertaking's faith in the particular appliance and secondly upon how much they were going to allow for servicing during that period. If they allowed 11s. per annum they would be on the safe side; but the lower they reduced the figure the greater the financial risk became.

**Mr. R. E. Tennyson d'Eyncourt** (Tottenham) agreed with the difficulty of obtaining a maintenance contract after the hire-purchase period had expired. The extra charge was a matter of real annoyance to the consumer. They had considered at Tottenham the possibility of making the charges in the hire-purchase price compulsory and adding a charge of 2s. per annum, which would provide a sum sufficient for carrying out a comprehensive maintenance scheme, including replacement of parts, for all consumers. The method of charge would be by means of an obligatory payment of 6d. per quarter. The question of whether or not such a charge would be legal was another matter; also whether consumers could be persuaded to pay it. He asked Mr. Randall whether his Company employed specialists to deal with each particular class of maintenance. Such a system was, he considered, a source of irritation to consumers. It led to bad feeling if the specialist maintenance man, having completed the servicing of his particular appliance, refused to attend to another appliance when asked to by a consumer. It was a very grave mistake to employ a man who could never carry out any job of maintenance than his own particular line.

## Women for Maintenance Work.

Had the South Metropolitan Company considered the employment of women for any class of maintenance work? In this connexion, he referred to the practice instituted by Mr. Clark Jackson at Neath whereby women carried out lighting maintenance. He understood that the North Middlesex Company also employed women for cooker burner maintenance. He also enquired as to the frequency of refresher courses for the maintenance men; the question of keeping the staff right up to date was a real problem. How was liaison maintained between the maintenance staff and how was useful information disseminated? It was not always an easy matter to get people to bring forward their considered findings arising from their experience on the district. He was under the impression that the South Metropolitan lighting burners were foolproof and required no adjustment. He further enquired whether high-pressure lighting was economical and was it proposed to continue and extend it? Mr. d'Eyncourt went on to refer to the importance of Home Service, which was an important part of any maintenance scheme. It was his experience, however, that the follow-up of new cooker sales by Home Service representatives was not always readily accepted by housewives. The consumer usually thought she knew best and was unwilling to be taught. Nevertheless, 80% of cooker complaints were not due to the cooker at all—which placed even more emphasis on the value of Home Service. Although they talked about "free" labour in connexion with space heating maintenance, the cost of labour was actually by far the major item.

Continuing, Mr. d'Eyncourt said that when they started the refrigerator business his Company initially instituted four calls per annum; but later on they reduced this to one. Here again Home Service played a vital part, for the ordinary housewife did not know how to get the best service out of her refrigerator. He thought the Gas Industry would have to recognize that the appliances of the future should not be designed to last but rather be cheap to manufacture and therefore cheap to replace.

**Mr. Randall** said that his Company had never actually tried the employment of women for maintenance work, but it was an interesting point. Their lighting burners did not have adjustable gas and air ports, and they were able to employ boys to service them. It was only necessary to give the burner half a turn to release it from its bayonet fitting, and the boys merely carried a camel hair brush for cleaning the ejector face, together with a duster, a spanner, and spare mantles. Liaison between service fitters was left to the district foremen. The whole service inside the house was controlled by the foremen, and so far as men making suggestions was concerned they had suggestion boxes, and rewards were given. The men were called in for refresher courses when there were sufficient new appliances to show them to make it worth while. They found high-pressure lighting in the large shopping areas a paying proposition—though in some isolated instances it might not be so. Of course, where they had high-pressure street lighting this offset considerably the cost of running the plant. With regard to the value of the Home Service Staff, they had used the oven thermostat as their method of *entrée*, because as they knew, the last five years had shown a general change-over to automatic oven control, and the Home Service representative was useful in explaining the operation of the thermostat to the consumer. Mr. d'Eyncourt was perfectly right in suggesting that the maintenance of space heating appliances was largely a labour charge. Out of, say, 1s. 9d. per visit for a portable heater 1s. 3d. was attributable to labour and of this amount 9d. was probably chargeable to walking time to and from the call.

## Cooker Maintenance.

**Mr. E. W. B. Dunning** (Gas Light and Coke) observed that the use of fixed injectors and governors had reduced the maintenance of cookers from once a year to once in three years. A Home Service representative used to call after every new cooker had been installed, but when their cooker sales rose to 80,000 a week they found this to be impossible. He found that 90% of their consumers were using the oven thermostat and were fully cognizant of its operation. On the other hand, the Home Service representative could be very useful in showing the correct positions for various dishes in the oven. Lighting devices on cookers were responsible for 70% of their maintenance costs. They also found that the oldest cookers required the least maintenance. The greater amount of maintenance required with the newer appliances was due not to any defect in the apparatus, but rather to the fact that purchasers knew they were entitled to free service and saw that they got it. Those with hired cookers called for very little maintenance and those owning their cookers least of all.

Replying to further questions by another Member, **Mr. Randall** said that they did receive complaints in some instances after a maintenance call. They had tried to discover the reason for this, but could find no other explanation than the fact that the service fitter having been in the house made the consumer curious as to whether the appliance really was working as well as he thought it should do. They had not had any serious trouble in that respect however. The fitters were not expected to take the valve to pieces every visit; if it was working satisfactorily they did not touch it. His point about anticipating future trouble was important, and only very experienced labour could overcome that difficulty, because if they received complaints in the intervening period it pushed the costs of servicing up tremendously. The hire-purchase of pokers never included maintenance, as they found this risky. In any case, a new blade could be purchased very cheaply. Some builders did not appreciate the water and flue requirements of gas water heaters, which often resulted in faulty installations. Flues might be badly planned, resulting in down-draught. Also, the water pipes might not be flushed out after installation with the consequence that the automatic valve would be choked with bits of hemp and red lead. If the system was fitted in accordance with the best possible plan, then obviously its chance of life would be longer.

**Mr. P. C. Buckle** (Gas Light and Coke) asked how the South Metropolitan Gas Company located and dealt with privately purchased and privately fixed appliances.

**Mr. Randall** said that the only possible way in which they were able to watch out for this was on the larger building estates where they knew builders were putting in their own appliances. Apart from this, it was the business of the district representative to find out where privately-owned appliances were installed.

**Mr. R. J. Pepper** (Gas Light and Coke) observed that regular maintenance did obviate complaint calls. On the other hand, he was of the opinion that maintenance was sometimes overdone. They inspected cookers, for instance, every three years, whereas it was his own opinion that cookers should not be inspected at all. A fitter worked for twenty minutes or half an hour servic-

ing a cooker—and how much better did he leave it? He also wondered whether one visit per annum was not too much for refrigerators. Their aim should be a rapid service for all complaints and the elimination of specialists for servicing work. It took about three years to eliminate specialists by training, so that the men could rectify any ordinary fault on any domestic appliance. If they were unable to do so, they should not call upon the specialist, but upon their own foremen. Maintenance men were worth a great deal to their undertaking if they could attend quickly and efficiency to *all* complaints; they added considerably to the goodwill felt towards the undertaking. Mr. Pepper stated that part exchange allowances in respect of cookers were very effective and led to the sale of thousands of new models; this was a step which should be generally adopted. In conclusion, he enquired what arrangements the South Metropolitan Gas Company made for the servicing of large-scale equipment and café installations.

**Mr. Randall** said that they had a short list of large-scale appliances which, in certain instances, they would supply on hire, and these were maintained by their own fitters. Appliances not included on that list were subject to servicing by arrangement with the makers. The Company's industrial service section looked after central heating installations. With regard to the maintenance of consumers' cookers, the aeration of the burners was often overlooked. Although the consumer might not complain, a partially choked air jet, while not leading to positive difficulty, nevertheless had its effect on efficiency and speed of cooking.

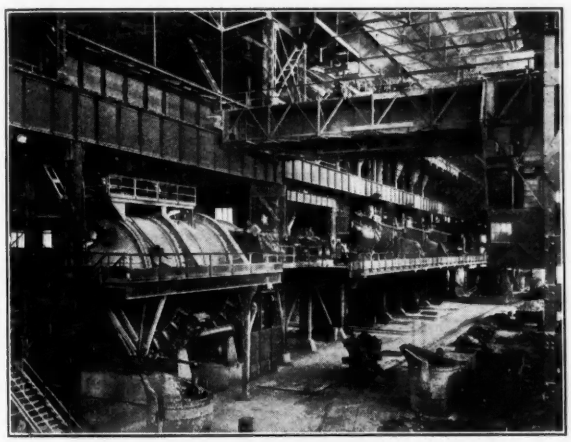
**Mr. Noble** remarked that there seemed to be an idea that they could lump all water heaters together into so many maintenance visits per annum without reference to the actual design of the heater. This was a fundamental mistake and gave no credit to the manufacturer who produced a heater which required less maintenance.

**Mr. Randall** agreed that this was an important factor, but considered that the suggestions he had put before them were fairly safe so far as existing appliances were concerned—*i.e.*, those on the sales lists of most reputable manufacturers, whose aim it was naturally to produce appliances which required the minimum amount of maintenance.

A cordial vote of thanks to Mr. Randall for his Paper was carried on the proposition of **Mr. Noble,** seconded by **Mr. S. J. Gibbons** (Gas Light and Coke).

# London and Southern Juniors at Corby

**The visit which the London and Southern District Junior Gas Association paid on March 22 to the Corby Works of Messrs. Stewarts & Lloyds, Ltd., must rank as one of the most interesting of its kind for many years.**



The Basic Bessemer Plant.

Some fifty members, under the Presidency of Mr. S. C. Waldock (Gas Light and Coke Company), were met at Kettering and conveyed by motor coach the intervening seven miles or so to Corby. Here, after a welcome by officials of the firm, the remainder of the morning was spent inspecting the coke ovens and blast-furnaces.

The by-product plant consists of 113 Becker coke ovens, of the cross-over flue regenerative combination type arranged in a single battery. The capacity of each oven is approximately 14½ tons of coal, the plant being designed for an output of 11,300 tons of coke a week.

Of particular note are the methods of handling the raw materials and the ingenious ramps for enabling railway waggons to be moved to and from the tipplers by gravity alone. The visitors watched the coke ovens being pushed, saw how the iron ore is crushed, and toured the blast-furnace plant. Surplus gas from the coke ovens, over and above the considerable quantity used for various works purposes, is taken by the Kettering Gas Company.

By kind invitation of Messrs. Stewarts & Lloyds, the Association were entertained at luncheon at the Corby Hotel—Mr. G. LE MARE (Office Manager at Corby) presiding.

The PRESIDENT voiced the thanks of the Association for the privilege of visiting the Corby Works. The works were sixty-nine years old and now controlled all the raw materials from which their tubes were manufactured. He congratulated the firm upon the lay-out and general efficiency of the works, which had been an eye-opener to them all. Mr. Waldock also referred to the many amenities the firm provided in connexion with the welfare of their employees—indicating that their aims did not end with the turning out of a good article. The Association were indebted to the Directors and Management for the opportunity of visiting the works, and he called upon the members to accord them a hearty vote of thanks.

Mr. H. W. H. BUTTERFIELD (South Suburban), the Senior Vice-President, seconded the vote of thanks and added an expression of appreciation to the guides who showed them round the works.

Mr. LE MARE thanked the speakers for their remarks, adding that it was scarcely necessary for him to say how much their visit was appreciated by the firm, who particularly welcomed the presence of an Association such as theirs. They were very glad to show them what processes were carried on before the tubes were delivered to them. He claimed that never before had anyone put down a tube works on an iron ore bed, of which they had the largest in the country. The battery of coke ovens, he said, carbonized 200 tons of coal a day. Stewarts & Lloyds had attempted to provide for the employees they had brought from Scotland, Birmingham, and other districts by building two thousand houses and by social activities of all kinds.

## The Tube Plant.

The afternoon was spent in touring the tube manufacturing section—from the basic Bessemer plant which converts the iron to steel by the addition of lime, through the rolling shops, to the finishing departments.

The basic Bessemer plant was designed by H. A. Brassert & Company, Ltd. Each of the converters has a capacity of 25 tons, with a maximum of 28 tons, being supplied with molten pig iron from two 1,000-ton mixers of special design to conserve the heat and equalize the variations in the hot metal. This mixer is fired by automatically controlled coke oven gas burners, one at each end, with an auxiliary burner at the spout. The metal is brought to the mixer directly from the blast furnaces in 60-ton ladles.

The basic bessemer vessels are blown by two turbo-blowers, so designed that the air pressure is maintained at any required figure. Blast furnace gas-fired kilns provide the requisite lime.

The soaking pits operate on straight blast furnace gas or with mixed gases; the proportion of blast furnace and coke oven gas in the mixture is automatically controlled and is variable between wide limits. From the soaking pits the ingots are transferred to a 40-in. reversing blooming mill, and after being rolled to specified dimensions, the blooms, slabs, and billets pass to up-cutting hot shears for cutting into slabs. Eventually the billets pass into re-heating furnaces or into stock. Finally there is the strip mill from which the finished coils of steel emerge ready, after cooling and inspection, for transfer to the tube works.

There are two processes of tube manufacture: (1) The Fretz-Moon—a continuous welding process for tubes from ⅛ to 2 in. nominal bore. There are three mills of this type, with an annual capacity of 160,000 tube tons. (2) The Wellman Push Bench—for seamless tubes, with a range of 2½ to 4 in. nominal bore, working in conjunction with a reducing mill of a special type for reducing down to ¾ in. nominal bore. The capacity of this plant is 50,000 per annum.

A fuller account of the many interesting processes carried on at Corby, together with illustrations of the works, will be found in the "JOURNAL" for June 3, 1936 (*pp.* 715-16).

Tea in the works canteen brought a most enjoyable and instructive visit to a close, and the members were conveyed back to Kettering to re-join their special coach for London.

# TRADE NEWS

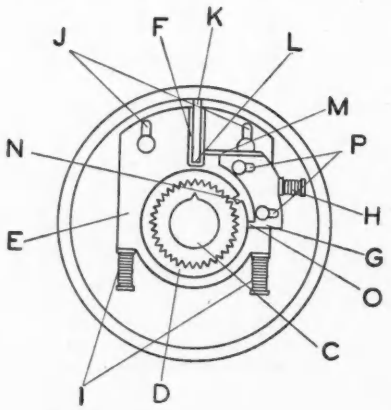
*What the manufacturers are doing by way of new and improved appliances, plant, and processes.*

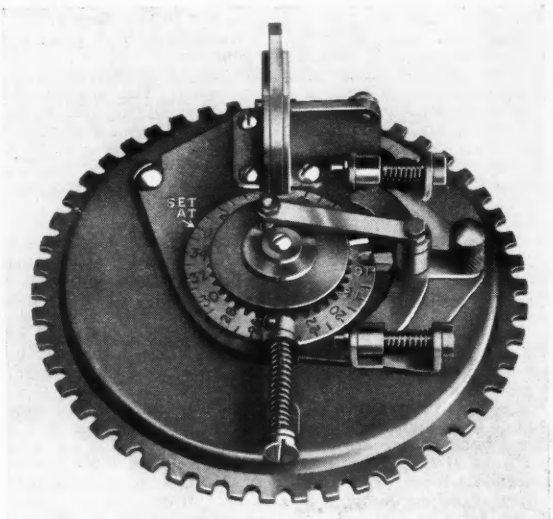
## A Two-Part Tariff Meter Mechanism.

The following notes on the description of a two-part tariff meter mechanism developed by Messrs. George Wilson Gas Meters, Ltd., of Foleshill Road, Coventry:

The present arrangement consists of a sixpenny insertion plate which is designed to function with the initial insertion of a predetermined number of shillings after which the plate automatically changes to take sixpences. For example, if it were desired to collect a fixed charge or rental of 3s. 6d. the plate would be set to receive 7s. before the change-over to sixpences took place, giving a surplus of 3s. 6d. over the actual gas charge. It is obvious that it may also be set as a shilling plate giving the consumer the gas at 50% reduction after the required number of shillings have been inserted. The design is notable for simplicity.

The diagram shows a rear view of a shilling set plate or mechanism. The 1s. is inserted through slot K into pocket F

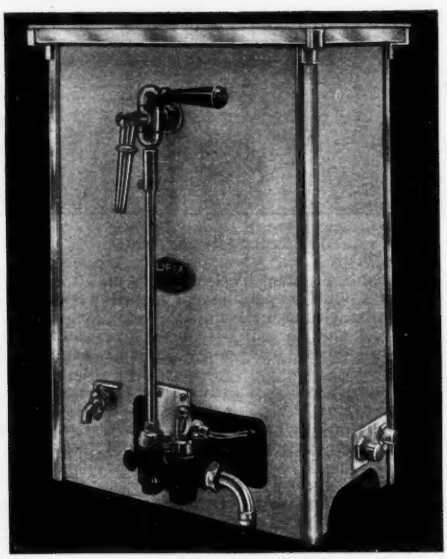



and locates between the inside of the drum and platform L. This movement pushes plate E along slide J comprising springs I, and bringing the serated member D, which is axially mounted to E, into the single tooth member C which is integral with the coining handle. The handle moves C, the equivalent of the pitch of the serations in D and then moves the plate D in a direction to operate the coining mechanism. This delayed movement will allow C to move the member D in an arcular movement turning the slot N in a direction towards the lug O. Thus after a present number of shillings have been inserted, the lug O will enter the slot N by pressure of the spring H, moving the platform M into the pocket F, the carrying bracket G being keyed to move along pegs P. A new platform is now in position and thus will enable the consumer to insert sixpences instead of the previous shillings and still obtain the same quantity of gas. This state of affairs continues until the money collector changes the member D back to the preset position, and the device is again put into operation. The mechanism can, of course, be amended to operate for any two coins of different values.

## A New Caterers' Boiler.

The Ufix Boiler Company, Ltd., of Terminal House, 52, Grosvenor Gardens, S.W. 1, have produced a caterers' boiler entirely new in exterior design. The complete unit, including the cold water feed cistern and all necessary pipes, is housed in a white vitreous enamelled case with chromium-plated corners and fittings. Incorporated in this design is the original "Ufix" interchangeable interior which was patented in 1926 and enables periodical de-scaling to be carried out without dismantling the boiler.



The machine rests on the counter or can be fitted to a wall, is easily installed, self-feeding, and fully automatic. Another important feature is the water circulation principle. A circulation chamber is attached to the interior, and the water is boiled as required. No discs or plates are used; therefore, all the waterways can be seen and the deposit easily removed. Two sizes are made—3½ pints per minute and 2½ pints per minute respectively.

The boiler is made of 18-gauge copper with brazed joints.

## "Harland" Electric Motors.

We have received from the Harland Engineering Company, Ltd., Alloa, three of their latest publications, dealing with medium size a.c. motors (X108), small a.c. motors (X92a), and high efficiency motors (X105). With the "Harland" High Efficiency motor, it is claimed that it is possible to make a drastic cut in one's power bill at full and fractional loads, because this motor has been specially designed for minimum losses at all loads.

### Messrs. Head, Wrightson, & Co., Ltd. : Polish Contract.

Messrs. Head, Wrightson, & Co., Ltd., of Thornaby-on-Tees, announce the receipt of a contract for tinning equipment from the Polish Steel Trust. The machines in question are similar to those supplied by the Company in 1938 to the Ebbw Vale steelworks for Richard Thomas & Co., Ltd.

### Controlling Gas Heated Processes.

At the exhibition of instruments, apparatus, and books cognate to physics in the textile industries, which is being held in the Physics Department of the University of Leeds on March 23, 24, and 25, in connexion with the Third Industrial Physics Conference, the Cambridge Instrument Company are to show, among other exhibits on their stand, a gas regulator and a hydrostatic regulator. The gas regulator forms a compact and convenient means of automatically controlling gas-heated processes at any temperature between 70° F. and 800° F. It is inserted direct in the pipe line, at any suitable point, and is connected by a length of capillary tubing to the sensitive bulb, which may be of various forms. A modified instrument is made to control a relay gas valve, enabling large ovens, with, for example, a 3-in. gas supply, to be regulated.

The hydrostatic regulator, for controlling the flow of steam, air, gas, oil, or water comprises a dial thermometer of the vapour pressure type combined with a hydrostatic valve so arranged that when the desired temperature is reached, water pressure is applied to a diaphragm valve in the supply pipe. This instrument is also suitable for temperatures up to 800° F.

### Overhead Radiant Heating.

An informative booklet has been published by Messrs. Bratt Colbran, Ltd., dealing comprehensively with overhead radiant heating. Following a general introduction recapitulating briefly the well-known advantages of radiant heating, there are set forth the types of heater available, description of heaters, performance, sinusoidal webs for bowl and wedge heaters, approximate and accurate assessments, fitting and arrangement, and methods of control. Appendices deal with such matters as precautions to be considered when fixing and detailed fixing arrangements for various types. The booklet is printed on art paper and liberally illustrated.

## Home Service Exhibition at St. Austell

### Excellent Attendances

In conjunction with the United Kingdom Gas Corporation, Ltd., and the South-Western Gas and Water Corporation, Ltd., a home service exhibition was held at St. Austell during the past week.

The hall was attractively fitted out with stands which were taken by various co-operating appliance makers, including Messrs. R. & A. Main, Ltd., the Parkinson Stove Company, Ltd., Messrs. John Wright & Co., Ltd. (Radiation Ltd.), Messrs. W. H. Dean & Son, Ltd., and Ascot Gas Water Heaters, Ltd. Chocolate was served at all demonstrations by Messrs. Cadbury Brothers.

A prominent feature was a gas-operated wireless set, "Music from the Gas Tap," which attracted very keen interest.

Cookery demonstrations were given by Miss Sybil Curd, of Messrs. R. & A. Main, Ltd., who demonstrated in turn on "New World," Parkinson, and Main cookers. Washing demonstrations were given by Miss Hilda Curle, of Messrs. W. H. Dean & Son, Ltd. Over 1,100 people attended the demonstrations and many more visited the exhibition during the week.

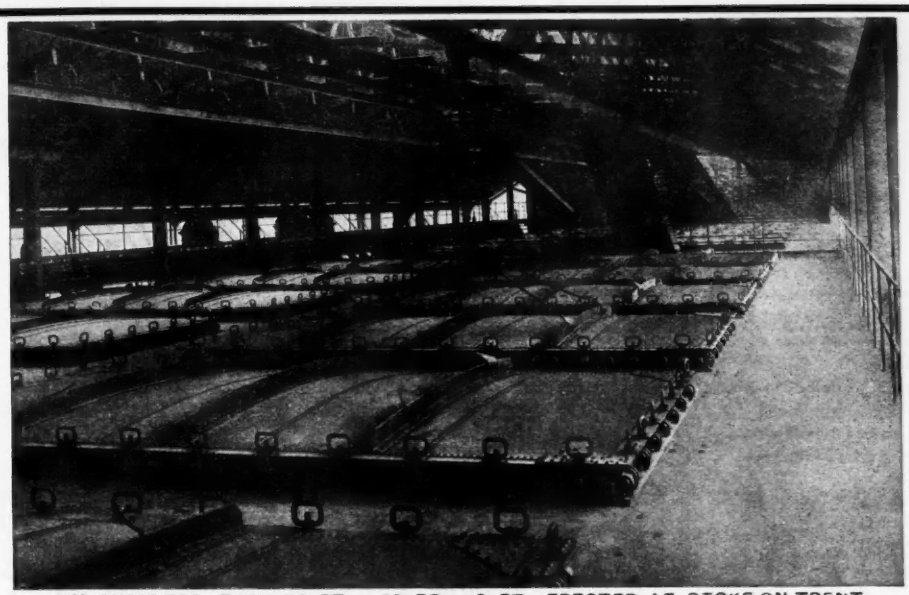
## A Courageous Demonstrator

### Shipley's Successful Exhibition

On the opening day of a series of cookery demonstrations held recently by the Shipley Urban District Council Gas Department in the Saltaire Institute, Miss Barbara Cobb, of the Parkinson Stove Company, was taken seriously ill with appendicitis. Miss Cobb, however, courageously carried on, proceeding with the first demonstration pending the arrival of another demonstrator from Birmingham. At the close of the lecture, however, she was compelled to return to her home.

In order that the evening lecture could take place, Mrs. Wilson, of Leeds, the wife of the Parkinson Stove Representative, Mr. R. Wilson, volunteered to take Miss Cobb's place and demonstrate cooking on "Renown" and "Crown" cookers, exactly as it would be carried out in her own home. The demonstration was very successful and well received by the audience. During the remainder of the week the lectures were given by Miss G. Hiscox, of the Parkinson Stove Company.

An exhibition of modern gas cookers and fires was also held and results were very satisfactory.



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A.D.1939

*A modern kitchen interior illustrating one of the foremost cookers of the day.*

No. MAIN 527

**STREAMLINED GAS COOKER**

R. & A. MAIN LIMITED, LONDON & FALKIRK

# Markets and Manufactures

## Current Sales of Gas Products

### The London Market

*March* 27.

Prices of Tar Products generally remain unchanged at about the following levels:

Pitch, nominal, at about 27s. 6d. per ton f.o.b.

Creosote, about 3½d. to 3¾d.

Refined tar, 3¾d.

Pure toluole, about 2s. 3d.

Pure benzole, about 1s. 9d.

95/160 solvent naphtha, 1s. 7d. to 1s. 8d.

90/160 pyridine, 10s.

All per gallon naked at makers' works.

### The Provinces

*March* 27.

Crude Gas-Works Tar, 12s. to 17s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 29s. to 30s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 29s. to 30s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3⅞d. to 4⅛d.; low gravity, 4d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d; filtered anthracene oil, min. gr. 1,080, 5½d. to 5¾d.; heavy tar oil, gr. less than 1,080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

### Scotland

GLASGOW, *March* 25.

Competition continues keen, although makers' prices show no material alteration.

Crude gas-works tar.—The actual value is now round 30s. to 32s. per ton *ex* works in bulk.

Pitch of vertical quality is very quiet at 21s. to 22s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Home prices are unchanged at 3¾d. to 4d. per gallon, while for export there is a little more enquiry with quotations at round 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil is very quiet, but makers' position is fairly comfortable. To-day's prices are as under: Specification oil, 3½d. to 3¾d. per gallon; low-gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid remains lifeless with values nominal at: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is unchanged at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon, and 90/190 heavy naphtha is round 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—190/160 grade is 8s. 6d. to 9s. 6d. per gallon, and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

### Benzole Prices

These are considered to be the market prices for benzole at the present time:

| | s. | d. | | s. | d. | |
|---|---|---|---|---|---|---|
| Crude benzole.. | 0 | 9½ | to | 0 | 10 | per gall. : t works |
| Motor " .. | 1 | 3 | " | 1 | 3½ | " " " |
| 90% " .. | 1 | 4 | " | 1 | 4½ | " " " |
| Pure " .. | 1 | 8 | " | 1 | 8½ | " " " |

## Contracts Advertised To-Day

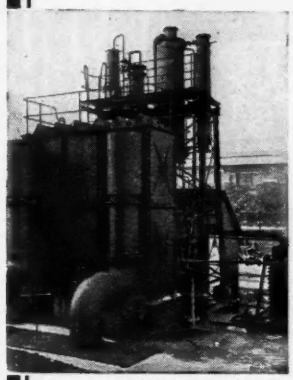
**Painting.**

Wigton Gas Department. [p. 910.]

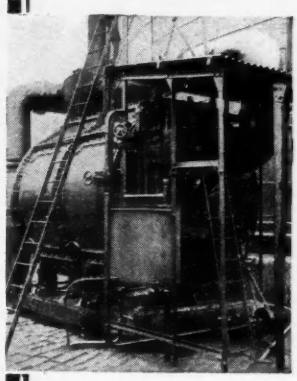
## Torquay and Paignton Gas Company

The Directors of the Torquay and Paignton Gas Company, in their report for the past twelve months, express pleasure at being in a position to state that there has been continued expansion in the demand for gas, an increased sale of over 17,000,000 cu.ft. having been recorded. During the year the acquisition of the undertaking of the Totnes and Bridgetown Gas Light and Coke Company, Ltd., was completed, and the accounts of that Company from March 25 have been incorporated in those of the Torquay Company. The works at Totnes have been closed down, and gas is now supplied to that area by high-pressure main from the Hollacombe works. There was issued by tender during the year £81,025 of 4% redeemable preference stock, in addition to the £20,000 of ordinary stock issued to shareholders in the Totnes Company, in accordance with the terms of the amalgamation. The balance carried to Profit and Loss Account is £19,455, as against £18,705 a year ago. The balance to the credit of this account is £9,162, subject to the final dividend on the ordinary 6% (basic) stock for the year. In 1937 the balance of net profit, subject to this dividend, was £13,225; but on the present occasion the Profit and Loss Account has had to bear the costs of the Torquay Gas Order, 1938, including Capital Duty, and the compensation and costs upon the acquisition of the Totnes undertaking. Including this acquisition, the capital expenditure during the year was over £64,000, which still leaves the Capital Account in credit to the extent of £74,419.


**25 Years' Hard!**



*"Permac" Joints in a Gas Works.*



*"Permac" Joints in a Gas Works.*

**Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil — screw pipe or flange.**

*Send for particulars*

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METAL-TO-METAL JOINTING MATERIAL

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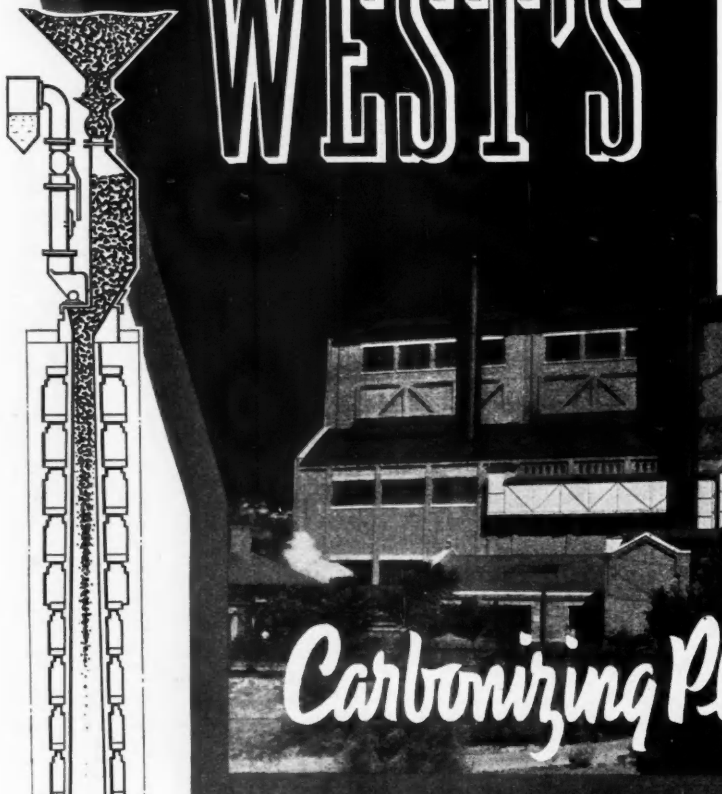
**THOMAS & BISHOP LTD**

**37, Tabernacle St.**
**LONDON, E.C. 2**

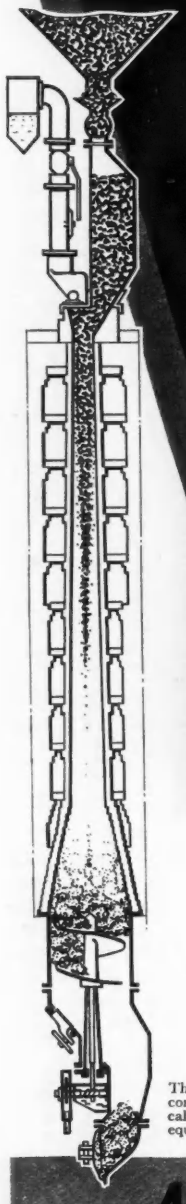
Telephone: Clerkenwell 3351 (2 lines)

# WEST'S

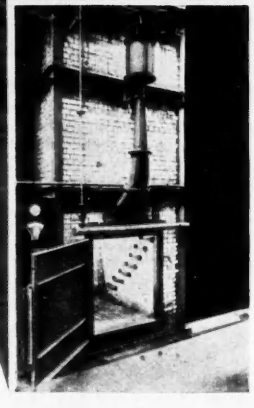
## Carbonizing Plants




Three installations of Glover-West vertical retorts, with coke-grading and waste-heat recovery equipment, at the Cottesloe gasworks of the Johannesburg Municipal Gas Department, and *(below)* step-grate producer equipped with steam-jet air injector to facilitate the burning of small coke and breeze under pressure—a view in the Glover-West vertical retort house at the Meadow Lane works of the Leeds Corporation Gas Department.



The Glover-West continuous vertical retort and equipment.



- Increased capacity in relation to ground area covered.
- Output readily adjustable to meet fluctuating demands.
- High yields of gas and coke with low maintenance costs.
- Clean working conditions within the retort house.
- Modern building design and smokeless operation.

**WEST'S GAS IMPROVEMENT COMPANY, LTD.**

MILES PLATTING, MANCHESTER 10 & COLUMBIA HOUSE, ALDWYCH, W.C.2

## Glover-West Vertical Retorts

**AND WESTVERTICAL CARBONIZING CHAMBERS**

**434 PLANTS BUILT OR ORDERED IN 24 COUNTRIES**

# GAS STOCKS AND SHARES

The European developments of last week led to spasmodic reactions and recoveries in all markets of the Stock Exchange as rumour followed rumour. There was heavy liquidation at the outset and quotations suffered severely, but by the end of the week prices were above their worst, and on balance there was not much in it. There appears little prospect of any immediate recovery in activity, as, apart from the anxieties regarding external events, the "House" is in a long Account, which includes the Easter holidays, and then comes the Budget on April 25—the few weeks preceding which was usually on the quiet side. British Funds came in for support towards the close and finished anything from ½ to 1½ down on the week. Home rails also weakened further. The volume of business in the industrial section remained comparatively small, and though prices began to harden later there was not sufficient support to make good the early losses.

The general situation was to a greater extent than usual reflected in the Gas market last week. There were fewer transactions, and as will be seen in the list below many of the leading "ordinaries" and fixed-interest stocks were marked down. Gas Light units with a drop of 1s. to 20s. 6d. and Croydon sliding-scale, which fell 5 points to 130½, recorded the heaviest reactions, while Imperial Continental closed 3½ down and Commercial lost another 3 points with a wider margin to 57. Business in the later stock was recorded at as low as 53 on Friday, although at the time of writing parcels are available at not less than 59 to yield £7 12s. 6d.% on a 4½% dividend.

Prices at the Provincial Exchanges remained firm, but a few small reactions in nominal quotations occurred in the Supplementary List.

There is more gas stock now available than for some time past, especially in the preference and debenture lists. The choice among "ordinaries" is not quite so wide, but most of the leaders are on offer and give good yields, as will be seen from the following table:

| Amount on Offer £ | —— | Dividend. % | Price. % | Yield, £ s. d. |
|---|---|---|---|---|
| 600 | British .. .. .. .. .. | 7½ | 131xd | 5 14 6 |
| 1,150 | Eastbourne "A" .. .. .. | 7½ | 131 | 6 0 3 |
| 5,000 | Gas Light units .. .. .. .. | £5 12s. | 21/- | 5 6 6 |
| 1,000 | Imperial Continental .. .. .. | 10 | 118 | 8 9 6 |
| 5,000 | South Metropolitan .. .. .. | 5½ | 100 | 5 10 0 |
| 500 | South Suburban .. .. .. .. | 6 | 113½ | 5 5 9 |
| 2,560 | Tottenham .. .. .. .. | 6¾ | 126 | 5 7 0 |
| 1,000 | Wandsworth .. .. .. .. | 6½(a) | 125 | 5 4 0 |

(a) Assumed dividend for 1939.

# Official Quotations on the London Stock Exchange

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 1,767,439 | Mar. 6 | 8 | 8 | Alliance & Dublin Ord. ... | 132—142 | ... |
| 374,000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. ... | 93—98 | ... |
| 734,733 | Nov. 7 | 5 | 5 | Assocd. Gas & Water U'd'ts Ord. | 17/—19/— | ... |
| 500,000 | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 19/—21/— | ... |
| 444,389 | ,, | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 19/—21/— | ... |
| 296,523 | ,, | 4 | 4 | Do. 4 p.c. Irred. Cum. Pref. | 16/—18/— | ... |
| 500,000 | Mar. 6 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 92—97 | ... |
| 560,070 | Feb. 20 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 155—160 | ... |
| 300,000 | Oct. 10 | 1/9⅝ | 1/4⅛ | Bombay, Ltd. ... ... ... | 21/—23/— | —/6 |
| 181,185 | Feb. 20 | 9½ | 9½ | Bournemouth sliding scale ... | 192—202 | ... |
| 690,526 | ,, | 7 | 7 | Do. 7 p.c. max. ... | 155—160 | ... |
| 493,960 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... | 128—133 | ... |
| 50,000 | Dec. 19 | 3 | 3 | Do. 3 p.c. Deb. ... | 75—80 | ... |
| 362,025 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 95—100 | ... |
| 335,000 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 113—118 | ... |
| 357,900 | Feb. 20 | 7½ | 7½ | Brighton, &c., 6 p.c. Con. ... | 141—146 | ... |
| 659,955 | ,, | 6¾ | 6¾ | Do. 5 p.c. Con. ... | 124—129 | ... |
| 205,500 | ,, | 6 | 6 | Do. 6 p.c. 'B' Pref. | 125—130 | ... |
| 855,000 | Mar. 20 | 7 | 8 | British Ord. ... ... ... | 128—133* | —2 |
| 100,000 | Dec. 19 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 138—143 | ... |
| 350,000 | ,, | 5⅛ | 5⅛ | Do. 5⅛ p.c. 'B' Cum. Pref. | 112—117 | ... |
| 120,000 | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 94—99 | —1 |
| 450,000 | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 100—105 | ... |
| 450,000 | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—95 | ... |
| 100,000 | 22 May '33 | 6 | 4 | Cape Town, Ltd. ... ... | 1—2 | ... |
| 100,000 | 6 Nov. '33 | 4½ | 4½ | Do. 4½ p.c. Pref. ... | 1—2 | ... |
| 150,000 | Dec. 19 | 4½ | 4½ | Do. 4½ p.c. Deb. ... | £0—70 | ... |
| 626,860 | Feb. 6 | 6 | 6 | Cardiff Con. Ord. ... ... | 115—120 | —1 |
| 237,860 | Dec. 19 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 102—108 | ... |
| 98,936 | Mar. 20 | 2/- | 2/- | Colombo Ord. ... ... | 1⅞—1⅞* | —⅛ |
| 24,510 | ,, | 1/4½ | 1/4½ | Do. 7 p.c. Pref. ... | 22/—24/—* | —/6 |
| 739,453 | Mar. 20 | -/11·48 | -/11·48 | Colonial Gas Assn. Ltd. Ord. | 16/—18/—* | —/6 |
| 296,144 | ,, | 1/3·30 | 1/3·30 | Do. 8 p.c. Pref. ... | 23/—25/—* | —/6 |
| 1,775,005 | Jan. 23 | 5 | 4 | Commercial Ord. ... ... | 52—62 | —3 |
| 140,000 | Feb. 6 | §13/4 | 4 | Do. 4 p.c. Red. Pref. ... | 95—100 | ... |
| 620,000 | Dec. 5 | 3 | 3 | Do. 3 p.c. Deb. ... | 62—67 | —4 |
| 286,344 | Feb. 20 | 5 | 5 | Do. 5 p.c. Deb. ... | 108—113 | —2 |
| 200,000 | ,, | 6¾ | 4 | Do. 3¾ p.c. Red. Deb. ... | 95—100 | ... |
| 807,560 | Feb. 20 | 7 | 7 | Croydon sliding scale ... | 128—133 | —5 |
| 644,590 | ,, | 5 | 5 | Do. max. div. ... ... | 95—100 | —3 |
| 620,385 | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. ... | 112—117 | ... |
| 239,000 | Feb. 6 | 5 | 5 | East Hull Ord. 5 p.c. ... ... | 93—98 | ... |
| 187,215 | Feb. 6 | 6 | 6 | East Surrey Ord. 5 p.c. ... | 113—118 | ... |
| 176,211 | Dec. 5 | 5 | 5 | Do. 5 p.c. Deb. ... | 110—115 | —2 |
| 250,000 | Nov. 7 | 8 | 4 | Gas Consolidation Ord. 'B' ... | 19/—21/— | ... |
| 250,000 | ,, | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 17/6—19/6 | ... |
| 19,189,963 | Feb. 6 | 5⅔ | 5⅔ | Gas Light & Coke Ord. ... | 19/6—21/6a | —1/- |
| 2,600,000 | ,, | 3½ | 3½ | Do. 3½ p.c. max. ... | 72—75 | —1 |
| 4,477,106 | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 93—97 | —1½ |
| 2,993,000 | Jan. 9 | 3½ | 3½ | Do. 3½ p.c. Red. Pref. ... | 95—98 | —1 |
| 8,602,497 | Nov. 21 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 73—77 | —1½ |
| 3,642,770 | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 108—112 | —½ |
| 3,500,000 | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Deb. ... | 105—109 | —½ |
| 700,000 | Mar. 6 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 93—96 | —1 |
| 270,466 | Feb. 20 | 6 | 6 | Harrogate New Cons. ... | 115—120 | ... |
| 157,500 | Mar. 20 | ‡1/- | ‡1/- | Hong Kong and China Ord. ... | ⅞—1* | ... |
| 213,200 | Feb. 6 | 5⅝ | 6 | Hornsey Con. 3½ p.c. ... | 97—102 | ... |
| 5,600,000 | Oct. 24 | 12 | 8 | Imperial Continental Cap. ... | 110—120 | —3½ |
| 172,810 | Jan. 23 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 88—93 | ... |
| 235,242 | Mar. 6 | 8½ | 8½ | Lea Bridge 5 p.c. Ord. ... | 150—160 | ... |
| 63,480 | Dec. 19 | 3 | 3 | Maidstone 3 p.c. Deb. ... | 68—73 | ... |
| 45,000 | Nov. 21 | †10 | †10 | Malta & Mediterranean ... | 130—135 | ... |
| | | | | Metropolitan (of Melbourne) | | |
| 392,000 | Oct. 3 | 5½ | 5½ | 5½ p.c. Red. Deb. ... ... | 100—105 | ... |
| 231,977 | Feb. 20 | 5 | 5 | M.S. Utility 'C' Cons. ... | 96—101 | ... |
| 968,658 | ,, | 4 | 4 | Do. 4 p.c. Cons. Pref. ... | 90—95 | —1 |
| 390,076 | Dec. 19 | 4 | 4 | M.S. Utility 4 p.c. Deb. ... | 92—97 | —1 |
| 148,955 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 110—115 | —2 |
| 125,000 | Jan. 3 | 3½ | 3½ | Do. 3½ p.c. Red. Bds. | 94—97 | ... |
| 675,000 | Nov. 21 | †6 | †6 | Montevideo, Ltd. ... ... | 70—75 | ... |
| 250,000 | Mar. 6 | 7½ | 7½ | North Middlesex 6 p.c. Con. | 140—145 | ... |
| 396,160 | Feb. 6 | 5 | 5 | Northampton 5 p.c. max. ... | 105—110 | ... |
| 300,000 | Oct. 24 | †7 | †9 | Oriental, Ltd. ... ... ... | 145—150 | ... |
| 468,537 | Dec. 5 | 8 | 7⅜ | Plymouth & Stonehouse 5 p.c. | 130—140 | ... |
| 621,667 | Feb. 20 | 8⅛ | 8⅛ | Portsmouth & Gosport Cons. | 154—159 | ... |
| 241,446 | ,, | 5 | 5 | Do. 5 p.c. max. ... | 98—103 | ... |
| 73,350 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 103—108 | —2 |
| 75,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... | 88—93 | ... |
| 114,000 | Feb. 6 | 5 | 5 | Preston 5 p.c. Pref. ... ... | 105—110 | ... |
| 247,966 | Dec. 19 | 4 | 4 | Primitiva 4 p.c. Cons. Deb. ... | 96—101 | ... |
| 625,959 | Jan. 9 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 94—99 | ... |
| 15,000 | Mar. 6 | 6 | 6 | San Paulo 6 p.c. Cum. Pref. ... | 8—9 | ... |
| 441,275 | Sept. 19 | 1/1½ | 1/1½ | Severn Val. Gas Cor. Ld. Ord. | 20/6—22/6 | ... |
| 460,810 | Mar. 20 | -/10⅝ | -/10⅝ | ,, ,, 4½ p.c. Cum. Pref. | 19/—21/—* | —/6 |
| 133,201 | Mar. 6 | 8½ | 5 | Shrewsbury 5 p.c. Ord. ... | 141—146 | ... |
| 9,000 | June 3 | 4 | ‡4 | South African Ord. ... ... | 4½—5½ | ... |
| 1,371,752 | Aug. 22 | 1/2⅜ | 1/2⅜ | South East'n Gas Cn. Ld. Ord. | 21/6—23/6 | ... |
| 871,636 | Mar. 6 | -/10½ | -/10½ | Do. 4½ p.c. Red. Cum. Pref. | 19/—21/— | ... |
| 498,818 | ,, | 4 | 4 | Do. 4 p.c. Cum. Pref. ... | 17/—19/— | ... |
| 450,000 | Feb. 6 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 96—101 | ... |
| 150,000 | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 93—98 | ... |
| 6,709,895 | Feb. 6 | 5 | 6 | South Met. Ord. ... ... | 94—98 | —2½ |
| 1,135,812 | ,, | 6 | 6 | Do. 6 p.c. Irred. Pref. ... | 125—130 | ... |
| 850,000 | ,, | 4 | 4 | Do. 4 p.c. Irred. Pref. ... | 90—95 | —2 |
| 1,895,445 | Dec. 19 | 3 | 3 | Do. 3 p.c. Deb. ... ... | 71—76 | —1 |
| 1,000,000 | Jan. 9 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 107—110 | ... |
| 600,000 | ,, | §31/- | 3⅜ | Do. 3⅜ p.c. Red. Deb. ... | 98—101 | ... |
| 1,543,795 | Jan. 23 | 6 | 6 | South Suburban Ord. 5 p.c. ... | 108—113 | —1 |
| 512,825 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 103—108 | —2 |
| 500,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 90—95 | —2 |
| 250,000 | ,, | 3⅜ | 3⅜ | Do. 3⅜ p.c. Red. Pref. ... | 91—96 | ... |
| 888,587 | Dec. 5 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 111—116 | ... |
| 250,000 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... ... | 92—97 | —1 |
| 200,000 | Feb. 6 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—95 | ... |
| 427,859 | Sept. 19 | 8⅜ | 9⅜ | S. Western Gas & Water Ord. | 16/—18/— | ... |
| 160,523 | Oct. 10 | -/10½ | -/10½ | Do. 4½ p.c. Red. Cum. Pf. | 19/—21/— | ... |
| 110,000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 95—100 | ... |
| 750,541 | Feb. 6 | 5 | 5⅛ | Southampton Ord. 5 p.c. ... | 104—109 | ... |
| 148,836 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. | 93—98 | ... |
| 350,000 | Feb. 6 | 5⅛ | 5⅛ | Swansea 5½ p.c. Red. Pref. ... | 105—110 | ... |
| 200,000 | Dec. 19 | 3⅛ | 3⅛ | Do. 3½ p.c. Red. Deb. ... | 92—97 | ... |
| 1,076,490 | Feb. 20 | 6¼ | 6¼ | Tottenham and District Ord. | 122—127 | ... |
| 409,835 | ,, | 5⅛ | 5⅛ | Do. 5½ p.c. Pref. ... ... | 114—119 | ... |
| 62,235 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 103—108 | —2 |
| 453,380 | Dec. 5 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 90—95 | —3 |
| 85,701 | Jan. 9 | 6 | 6 | Tuscan 6 p.c. Red. Deb. ... | 95—100 | ... |
| 1,131,550 | Aug. 22 | 6 | 4 | U. Kingdom Gas Cor. Ord. ... | 18/—19/— | ... |
| 1,051,280 | Nov. 7 | 4½ | 4½ | Do. 4½ p.c. 1st Cum. Pref. | 19/—21/— | ... |
| 762,241 | ,, | 4 | 4 | Do. 4 p.c. 1st Red. Cum. Pf. | 19/—21/— | ... |
| 745,263 | Dec. 19 | 4½ | 4½ | Do. 4½ p.c. 2nd Non-Cum. Pf. | 15/6—17/6 | ... |
| 1,066,186 | Mar. 6 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 96—99 | ... |
| 378,106 | Mar. 6 | 7 | 7 | Uxbridge, &c., 5 p.c. ... ... | 122—127 | —1 |
| 133,010 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 102—107 | —1 |
| 1,371,138 | Jan. 23 | 7 | 7 | Wandsworth Consolidated ... | 120—125 | —2 |
| 2,525,768 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 90—95 | ... |
| 1,343,964 | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 110—115 | —1 |
| 383,745 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... ... | 92—97 | —1 |
| 400,000 | ,, | §25/- | 3⅜ | Do. 3⅜ p.c. Red. Deb. ... | 96—101 | ... |
| 558,342 | Feb. 6 | 6¾ | 6¾ | Watford and St. Albans Ord. | 127—132 | ... |
| 200,000 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 103—108 | —2 |
| 200,000 | ,, | 5⅛ | 5⅛ | Do. 5⅛ p.c. Pref. ... | 110—115 | —2 |
| 200,000 | ,, | §16/8 | 4 | Do. 4 p.c. Red. Pref. ... | 95—100 | ... |
| 200,000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 93—98 | ... |
| 200,000 | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 92—97 | ... |

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

**Supplementary List and Provincial Exchanges overleaf.**

# STOCK AND SHARE LIST—Cont.

## Supplementary List, not Officially Quoted, London

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Nominal Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 202,152 | Mar. 20 | 5 | 5 | Ascot Ord. ... ... ... | 99—104* | −2 |
| 128,182 | Dec. 19 | 5 | 5 | Do. 5 p.c. Pref. ... ... | 102—107 | −2 |
| 31,035 | Mar. 20 | −/4⅛ | −/4⅛ | Associated Utilities 4 p.c. Pref. | 15/—17/−* | ... |
| 100,000 | Dec. 19 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 95—100 | ... |
| 17,000 | Feb. 20 | 8 | 8 | Bognor Orig. Ord. 'A' ... | 152—162 | ... |
| 62,210 | ,, | 8 | 8 | Do. New Addl. 'A' ... | 152—162 | ... |
| 67,160 | ,, | 7 | 7 | Do. New 7 p.c. max. ... | 142—152 | ... |
| 37,440 | Feb. 6 | 10 | 10 | Cam. Univ. & Town 10 p.c. max. | 183—193 | ... |
| 125,970 | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 131—136 | ... |
| 39,025 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 95—100 | ... |
| 96,410 | Feb. 6 | 4½ | 4½ | Cardiff 4½ p.c. Pref. ... ... | 93—98 | ... |
| 150,000 | Feb. 20 | 4 | 4 | Croydon 4 p.c. Pref. ... ... | 91—96 | ... |
| 130 000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 93—98 | ... |
| 65,000 | Mar. 6 | 7½ | 7½ | Eastbourne 'A' 5 p.c. ... | 128—133 | ... |
| 198,000 | ,, | 6 | 6½ | Do. 'B' 3½ p.c. ... ... | 111—116 | ... |
| 112,312 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 102—107 | −3 |
| 130,000 | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 108—113 | −2 |
| 24,000 | Feb. 20 | 8½ | 8½ | Great Yarmouth 8½ p.c. max. | 30—35 | ... |
| 59,400 | ,, | 7½ | 7½ | Do. 7½ p.c. max. ... ... | 27—32 | ... |
| 51,160 | Dec. 5 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 117—122 | ... |
| 152,600 | Feb. 20 | 8 | 9 | Guildford Cons. ... ... | 160—165 | ... |
| 54,055 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 102—107 | −1 |
| 68,250 | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 109—114 | ... |
| 156,600 | Feb. 20 | 7½ | 7½ | Hampton Court Cons. ... | 120—125 | ... |
| 80,000 | Mar. 6 | 4 | 4 | Lea Bridge 4 p.c. Pref. ... | 90—95* | ... |
| 60,000 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... ... | 120—125 | ... |
| 94,876 | Dec. 5 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 90—95 | −2 |
| 73,620 | Mar. 6 | 8½ | 8½ | Luton Cons. 'A' ... ... | 150—160 | ... |
| 107,960 | Mar. 20 | 4 | 5⅛ | Mid Kent Ord. ... ... | 8½—9½* | ... |
| 230,940 | Feb. 6 | 10 | 10 | Oxford & District Ord. ... | 192—197 | ... |
| 47,112 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 102—107 | −2 |
| 50,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 108—113 | ... |
| 126,193 | Nov. 7 | 7½ | 7½ | Peterborough Ord. ... ... | 137—142 | ... |
| 64,990 | Mar. 6 | 7½ | 7½ | Redditch Ord.... ... ... | 115—125 | ... |
| 166,850 | Feb. 6 | 8 | 8 | Romford Ord.... ... ... | 142—147 | ... |
| 60,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 97—102 | ... |
| 44,000 | Mar. 20 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 108—113* | −2 |
| 25,570 | Feb. 6 | 5½ | 5½ | Rugby 5½ p.c. Pref. ... ... | 118—123 | ... |
| 25,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 103—108 | ... |
| 42,750 | Dec. 5 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 117—122 | ... |
| 110,950 | Feb. 20 | 8 | 8 | Ryde Ord. ... ... ... | 137—147 | ... |
| 270,086 | Mar. 20 | 7 | 7 | Slough Ord. ... ... ... | 126—131* | −2 |
| 21,000 | Dec. 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 107—112 | ... |
| 28,872 | Nov. 7 | 5½ | 5½ | S. Midland Gas Cpn. Ltd. Ord. | 17/—19/− | ... |
| 28,866 | Mar. 6 | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 17/—19/− | ... |
| 117,228 | Feb. 20 | 5 | 7 | Swindon Cons. ... ... | 100—105 | ... |
| 60,425 | Dec. 5 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 108—113 | ... |
| 64,380 | Dec. 19 | 5 | 5 | Torquay & Paignton 5 p.c. Pref. | 105—110 | ... |
| 130,000 | Feb. 6 | 5 | 8 | Wakefield Ord. ... ... | 116—121 | ... |
| 81,650 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 92—97 | ... |
| 82,000 | Jan. 23 | 6 | 6 | Weymouth Ord. ... ... | 101—106 | ... |
| 98,384 | Feb. 6 | 6 | 6 | Wolverhampton 6 p.c. Pref. | 117—122 | ... |
| 160,000 | Dec. 19 | 5½ | 5½ | Do. 5½ p.c. Rd. Db. | 103—108 | ... |
| 90,000 | Dec. 19 | 5 | 5 | York 5 p.c. Red. Deb. ... | 102—107 | ... |
| 133,640 | Feb. 20 | 6½ | 6½ | Yorktown (Cam.) 5 p.c. Cons. | 115—120 | ... |
| 120,000 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 103—108 | ... |
| 35,000 | Dec. 5 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 115—120 | ... |

## BRISTOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 347,756 | Feb. 6 | 5 | 6 | Bath Cons. ... ... ... | 115—117 | ... |
| 1,667,250 | Feb. 6 | 5 | 5 | Bristol, 5 p.c. max. ... ... | 109½—111½ | ... |
| 120,420 | Dec. 19 | 4 | 4 | Do. 1st 4 p.c. Deb. ... | 98—101 | ... |
| 415,250 | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 98—101 | ... |
| 328,790 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 115—118 | ... |
| 274,000 | Feb. 20 | 5 | 5 | Newport (Mon.) 5 p.c. max. ... | 95—97 | ... |
| 13,200 | Mar. 20 | 7 | 8⅜ | Pontyp'l Gas & W. 10 p.c. 'A' | 12⅝—13½* | −⅛ |
| 13,600 | ,, | 6 | 5 | Do. 7 p.c. 'B' ... | 11½—12* | ... |
| 40,000 | ,, | 6 | 5 | Do. 7 p.c. 'C' ... | 11½—12* | ... |
| 140,778 | Feb. 6 | 5 | 5 | Weston-super-Mare Cons. ... | 103½—105½ | ... |
| 64,338 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. ... | 98—101 | ... |
| 33,340 | ,, | 7½ | 7½ | Do. 7½ p.c. Deb. ... | 149—152 | ... |

## LIVERPOOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 157,150 | Feb. 6 | 5 | 6½ | Chester 5 p.c. Ord. ... ... | 107—110 | ... |
| 92,500 | Dec. 19 | 4 | 4 | Do. 4 p.c. Pref. ... ... | 95—99 | ... |
| 36,430 | ,, | 3½ | 3½ | Do. 3½ p.c. Deb. ... ... | 87—90 | ... |
| 41,890 | ,, | 4 | 4 | Do. 4 p.c. Red. Deb ... | 97—101 | ... |
| 2,167,410 | Feb. 20 | 6 | 6 | Liverpool 5 p.c. Ord. ... ... | 120—122 | ... |
| 245,500 | Dec. 19 | 5 | 5 | Do. 5 p.c. Red. Pref. ... | 100—105 | ... |
| 306,083 | Jan. 23 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—102 | ... |
| 106,280 | Feb. 6 | 10 | 10 | Preston 'A' 10 p.c. ... ... | 177—187 | ... |
| 188,219 | ,, | 7 | 7 | Do. 'B' 7 p.c. ... ... | 129—139 | ... |

## NEWCASTLE EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 122,577 | Feb. 20 | 8 | 8 | Blyth 5 p.c. Ord. ... ... | 157½—158½ | ... |
| 732,000 | Feb. 20 | 3 | 3 | Hartlepool G. & W. Cn. & New | 67½—68½ | ... |
| 2,061,315 | Feb. 6 | 5 | 5½ | Newcastle & Gateshead Con. | 22/6—23/−σ | ... |
| 682,856 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... | 99—101 | +1 |
| 776,706 | Dec. 19 | 3½ | 3½ | Do. 3½ p.c. Deb. ... | 88—89 | ... |
| 277,285 | Oct. 24 | 5 | 5 | Do. 5 p.c. Deb. '43 ... | 103½—105½ | ... |
| 332,351 | Feb. 6 | 6 | 6 | Sunderland 6 p.c. max. ... | 132½—134½ | ... |

## NOTTINGHAM EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 542,270 | Feb. 6 | 6 | 9 | Derby Con. ... ... ... | 132—137 | ... |
| 55,000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—105 | ... |
| 20,000 | Dec. 19 | 5 | 5 | Long Eaton 5 p.c. Pref. ... | 10—12 | ... |
| 80,000 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 105—110 | ... |

## SHEFFIELD EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations March 24. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 10,000 | Feb. 6 | 10 | 10 | Great Grimsby 'A' Ord. ... | 180—190 | ... |
| 6,500 | ,, | 10 | 10 | Do. 'B' Ord. ... | 180—190 | ... |
| 79,000 | ,, | 10 | 10 | Do. 'C' Ord. ... | 175—185 | ... |
| 1,806,339 | Feb. 20 | 6½ | 6½ | Sheffield Cons. ... ... | 135½—137½ | ... |
| 95,000 | Dec. 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—102 | ... |

σ The quotation is per £1 of Stock.
* Ex div.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